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GILL, Theodore - 1876

REPORT ON ICTHYOLOGY

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explorations across the great basin
of the territory of Utah in 1859,
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ENGINEER DEPARTMENT, U. S. ARMY.
EXPLORATIONS ACROSS THE GREAT BASIN OF UTAH IN 1859.
IN CHARGE OF CAPT. J. H. SIMPSON, TOPOGRAPHICAL ENGINEERS.

REPORT

ON

ICHTHYOLOGY.

BY

PROF. THEO. GILL.

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National Museum.

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APPENDIX L.

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BY PROF. THEO. GILL.

SMITHSONIAN INSTITUTION,
Washington, December 1, 1860.

SIR: I have the honor to forward to you the report on the ichthyology of your expedition, which I have been requested to prepare.

Although few species of fishes were obtained, they are of much interest. Most of them have been fully described in the accompanying report, even when not new, as in the case of the species which is now called *Platygobio communis.* As all the groups to which the respective species belong are in some confusion and not well restricted, I have been compelled to examine the history and nomenclature of not only the genera to which they are referable, but of the allied ones. As in almost all the cases, such genera have been limited in a different manner and considerable modifications introduced, I have always given the full generic characters, founded on a personal examination, or a careful perusal of the descriptions of all the known species of the genera. This I have considered to be the course most advantageous, under the circumstances, to science.

The classification which I have here followed is that which I have proposed and published in the Proceedings of the Academy of Natural Sciences of Philadelphia. It may be considered a modification of that of the illustrious and learned Johannes Müller, whose recent death has been so much mourned by naturalists; it differs from the Müllerian classification in the very different acceptation and restriction of the orders and suborders.

The investigations which have been undertaken in the preparation of the report have been pursued in the Smithsonian Institution; and to the power of availing myself of the excellent Library and Museum of the Institution, such value as the report may have is due.

I am, sir, very truly yours,

THEO. GILL.

Capt. J. H. SIMPSON.

Subclass TELEOSTEI, Müller.

Order TELEOCEPHALI, Gill.

Suborder PHYSOCLYSTI, (Bon.) Gill.

Family PERCOIDÆ, (Cuv.) Gill.

Subfamily LABRACINÆ, Gill.

There is found in the Mediterranean Sea a fish which has, from the earliest times, attracted the attention of the inhabitants of the neighboring coasts from the abundance in which it is found and the size to which it attains. By the ancients, as at the present day, it was much esteemed as an article of food, and was called by the Greeks λάβραξ, and by the Romans *lupus*. Of this fish, Cuvier has said (but scarcely with strict correctness) that its appearance and almost all the details of its form recall to mind the *perch*, and that a just idea would be given of it by describing it as a "*large, elongated, and silvery perch*".

From the *Perches*, however, it differs in several characters, which induced Cuvier to separate it generically, and for the name of the genus he adopted the Greek designation of the species. The characters by which Cuvier distinguished it from the Perches were the presence of teeth on the tongue and of two spines to the operculum. It differs also from the true Perches in the armature of some of its bones and by the shorter spinous dorsal fin, the rays in the European and allied American species being always nine, and still more by modifications of the skeleton and among others the small number of vertebræ, of which there are 11 or 12 abdominal and 13 or 14 caudal. The very distinct type represented by *Labrax Japonicus* Cuv. and Val. (=*Lateolabrax Japonicus* Bleeker) has, however, 16 abdominal and 19 caudal vertebræ.

Though Cuvier was the first to properly distinguish the genus, its type had been long previously recorded by Klein as the first of two species, which he placed in a group, for which he used the same name *Labrax*.

That author, in his fifth and last Missal for the Advancement of the Natural History of Fishes,* has devoted his ninth fasciculus to the consideration and description of those fishes provided with two dorsal fins. In this group he includes the Trouts (*Trutta* Klein), in which the first dorsal is sustained by branched rays while the second is adipose, as well as *Mullus*, *Cestræus* Klein, *Labrax* Klein, *Sphyræna*, *Gobio* Klein, *Asperulus* Klein, and *Trichidion* Klein, in which the first dorsal is spinous and the second has branched rays. *Trutta* of Klein is synonymous with the extended genus *Salmo* of Linnæus; *Mullus* embraces, like the Linnæan genus, the *Mulli* and the *Amias* of Gronovius, or *Apogons* of Lacépède; the *Cestræi* are the *Mugiles* of Linnæus; *Sphyræna* is limited to the true species of the genus as now accepted; *Gobio*

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*Jacobi Theodori Klein Historiæ Piscium promovendæ Missus quintus et ultimus de piscibus per branchias apertas respirantibus, *Gedani*, Litteris Schreiberianis, 1749.

is equivalent to *Gobius* of Linnæus; *Asperulus* to *Aspro* of Cuvier; and *Trichidion* to *Polynemus* of Linnæus.

The group, it will be thus seen, is composed of very dissimilar elements. From it are also excluded *Perca*, and other genera with the dorsal fins quite as distinct. The Perches are placed in a group of which the character is the presence of only one dorsal entire or sinuate.

Labrax itself is defined* as having as many fins as *Cestræus* (or *Mugil* Linn.); serrated scales; the mouth large, and provided with numerous slender teeth in many rows. Two species are referred to it: the *Labrax diacanthus* Gill (*Sciæna diacantha* Bloch, *Labrax lupus* Linn.); and the *Centropomus undecimalis* of Lacépède, and the moderns. The genus itself is therefore not very unnatural, but its characters are common to many others, especially to *Perca*.

In the second and third volumes of the great "Histoire Naturelle des Poissons", Cuvier and Valenciennes have referred to the genus *Labrax* seven nominal species, six of which are described in the former volume.

Of these, the *Labrax lupus* is the type of the genus, and is distinguished by the spur-like spines of the inferior margin of the preoperculum; the presence of a perfect marginal band of teeth, and of an oval basal patch on the tongue; three spines to the anal fin; and other characters, which have been noticed in the preceding synopsis. To this should the name *Labrax* be restricted.

The second species (*le Bar alongé*, or *Perca elongata* of Geoffroy) is distinguished by finer and more numerous teeth on the inferior border of the preoperculum, and the presence of only two anal spines. The distinctive characters of this species, however, require to be confirmed.

The third species is the *Labrax lineatus* of Cuvier, the common Rock-fish or Striped Bass of the United States. This has been taken as the type of a new genus, for which Mitchill's name *Roccus* is preserved. The characters are given below. To this genus should be also referred the *Labrax multilineatus* described by Cuvier and Valenciennes in the third volume of their "Histoire Naturelle des Poissons".

The fourth species, *Labrax Waigiensis*, has been identified by Bleeker with the *Psammoperca datnioides* of Richardson; if this is correct (and, notwithstanding the discrepancies between the descriptions of the "Histoire Naturelle" and Richardson, such appears to be the case), it belongs to a very distinct genus from the *Labrax lupus*. The teeth of the jaws, vomer, and palatines are described by Richardson as crowded, rounded, and granular, while by Cuvier the teeth on both jaws, the chevron of the vomer, and the palatines are said to be villiform ("dents en velours"): it is also stated by Cuvier that there is a small oval disk at the base of the tongue; by Richardson, the tongue is said to be smooth. In the latter statement, however, he disagrees not only with Cuvier and Valenciennes, but with Bleeker, who also asserts† that there is an oblong patch at the base of the tongue, "lingua basi thurma denticulorum scabra." Both authors agree as to the presence of a single spine to the operculum (although one of the generic characters assigned to *Labrax* by Cuvier was the presence of two spines on that bone),

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[*] Pinnas habet tot quot Cestræus et Mugil: squamas serratas: os magnum plurimis tenuissimisque dentibus multiplici ordine munitum. Voracissimus.

[†] Natuurkundig Tydschrift voor Nederlandsch Indie, vol. ii, p. 479.

and of a strong horizontal spine at the angle of the preoperculum, above which the margin is pectinated.

The next species in order, *Labrax Japonicus* of Cuvier and Valenciennes, is the type of the genus *Lateolabrax* of Bleeker,* which is widely separated from *Labrax* by the absence of any teeth on the tongue, the increased number of its vertebræ, &c. In the plectroid armature of the operculum, it however resembles that genus.

The last species, *Labrax mucronatus*, is also now considered as the type of a new genus, for which the name *Morone* is accepted. Its generic characters and affinities will be given at length in a subsequent portion of this memoir.

Of the seven species referred by Cuvier and Valenciennes to the genus *Labrax*, five are thus seen to belong to different genera. Nor do any of these genera appear to be unnecessary; but, on the contrary, all of them are well distinguished from each other by characters that ichthyologists must admit are of importance: two of the species, indeed, that were referred to the genus by the French naturalists, do not agree with their diagnosis of that genus, and it is doubtful, indeed, whether they have any near relations with the others. It is not in disparagement of those celebrated and able men that these remarks have been made. The progress of scientific discovery and the examination of better materials have enabled their successors to discover the errors of the founders of modern ichthyology. None could have performed the work at that day better than they.

Having long since, from an examination of the descriptions of various authors, been aware of the confusion and uncertainty in which our American species of the Cuvierian *Labrax* were enveloped, I believed that it might be a useful task to attempt the elucidation of the genus. The results of the investigations undertaken therefor have been published, in the Proceedings of the Academy of Natural Sciences of Philadelphia for April, 1860, as a "Monograph of the Genus *Labrax* of Cuvier."

Most of our general remarks are reproduced, with many additional ones, in the present report. The nominal American species admitted by Drs. De Kay and Storer in the genus *Labrax* amount to seven, and another specific name has been since added by Filippi, an Italian naturalist. It has been attempted to demonstrate, in our monograph of the genus, that all of those nominal species are referable to three true ones. Three of the synonyms apply to one species, and four to another.

Besides the species that have been attributed to the genus by Richardson, De Kay, and Filippi, several others have been described under that name by modern naturalists. Dr. Charles Girard has noticed two of these in the "Proceedings of the Academy of Natural Sciences of Philadelphia" under the names *Labrax nebulosus* and *L. clathratus*. He afterward constructed for them a new genus, which he called *Paralabrax*, and correctly placed it in the vicinity of *Serranus;* they are indeed very closely related to that genus as now restricted.

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* By a misunderstanding, the name *Percalabrax* has been taken by some authors as the generic denomination of this type. Cuvier (Hist. Nat. des Poissons, i, 55) has remarked, "Nous avons cru, pour plus de clarté, devoir donner un nom particulier à chaque sous-genre; mais ceux qui tiendraient à conserver la nomenclature des grands genres de Linnæus, pourraient placer ce nom sous-générique entre deux parenthèses, comme Linnæus l'a fait en quelques occasions, et dire, par exemple; *Perca (labrax) lupus; Perca (labrax) lineata*, etc." Temminck and Schlegel, following this suggestion but omitting the parentheses, called the *Perca (labrax) Japonicus*, *Perca-Labrax Japonicus*, evidently accepting the views of Cuvier as to the limits of the subgenus *Labrax*. Bleeker, quite properly recognizing the generic peculiarities of the species, called it *Lateolabrax;* but Dr. Albert Günther (in the first volume of a Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum, 1859, p. 70), mistaking the meaning of Temminck and Schlegel, has called it *Percalabrax.*

Mr. Hill, of Jamaica, in a useful catalogue of the fishes of that island, has also noticed a fish which he referred to *Labrax* under the name of *L. pluvialis,* or the Rainy-weather Chub. It is said by that gentleman to be confounded by the fishermen with the *Labrax mucronatus* (=*Morone americana* of this article), but differs from it by the presence of vertical bars, like those of the common perch of Europe and America. Until more authentic information is obtained, the relations of that species must be entirely conjectural, and it is probable that it has no affinity to the *Labraces.*

GENUS ROCCUS, (MITCH.) GILL.

Synonymy.

ROCCUS *Mitchill,* Report in part on the Fishes of New York, p. 25, 1814.
ROCCUS *Gill,* Proceedings Academy of Natural Sciences of Phila., vol. xi, p. 111, 1860.
LEPIBEMA *Raf.,* Ichthyologia Ohiensis, p. 23, 1820.
SCIÆNA sp. *Bloch.*
PERCA sp. *Bloch and Schneid., Mitchill,* 1818.
CENTROPOME sp. *Lac.*
LABRAX sp. *Cuv., auct. al.*

Labraces with pectinated preoperculum, cycloid or imperfectly ctenoid cheek and opercular scales, lingual teeth developed in a marginal band as well as at the base, and skull with compressed non-diaphanous brain-case and no mastoid projections.

The body is elongate, subfusiform or oblong-ovate, compressed, and with the back anteriorly curved.

The head is compressed, laterally oblong conic. The operculum is armed with two spines, the upper of which is small; the preoperculum pectinated both behind and below; the suborbital bones entire. The muciferous cavities of the lower jaw are not very evident.

Teeth on the intermaxillary, dentary, palatine, and vomerine bones villiform; those on the tongue present in a band along the lateral margins, and in two longitudinal rows, or an elongated oval patch at the base. Interbranchial osselets smooth.

The scales are ctenoid on the body, but on the head, from the nape to the nostrils, and on the cheeks, are mostly cycloid.

The lateral line is straight and continuous to the base of the caudal fin.

The dorsal fins are not united by a perceptible membrane; the anterior fin has nine spinous rays; the second is oblong, with one spinous, and from eleven to fourteen branched ones.

The anal fin is opposite the second dorsal, and has three spinous rays regularly increasing in size.

The caudal is emarginate.

The skull has the brain-case with nearly flat sides below, rectilinear and flat toward the aperture for the last two branches of the fifth nerve, a vacuity on each side between the basioccipital and alispheroid bones, and the postfrontals laterally well developed.

The genus *Roccus* is very closely allied to both *Labrax* as now restricted as well as to *Morone.* From *Labrax,* it differs chiefly in the character of the armature of the preoperculum, and by the absence of the teeth at the anterior extremity of the tongue; the whole margin of the tongue in the latter genus being provided with a band of villiform teeth, and the spur-formed teeth of the inferior margin of the preoperculum calling to mind the genus *Plectropoma* of Cuvier among the *Serrani.* The difference between the last-named genus, or at least some of its species, and *Serranus* is indeed not of as great value as that between *Labrax* and *Roccus.* The only constant character between *Serranus* and *Plectropoma,* as those genera were established by Cuvier, is the spur-like armature of the inferior border of the preoperculum, while *Labrax* and *Roccus* are distinguished, not only by an equally great and constant difference of the preopercular border, but also by the difference of the lingual dentition. As the former character is of as great value in the *Labraces* as in the *Serrani,* consistency will require that if *Plectropoma* and *Serranus* are considered as distinct genera, *Roccus* and *Labrax* should also be so regarded.

The difference between *Roccus* and *Morone* is of even more importance than that of *Roccus* and *Labrax.* The distinguishing characters will be referred to under the diagnosis of *Morone.*

The name which has been adopted for this genus is one given by Dr. Mitchill, in the year 1814, to a medley comprising the *Roccus lineatus* (which he called *Roccus striatus*) and the *Otolithus regalis* (which was designated as *Roccus comes*). The name was solely the result of ignorance, on the part of the author, of the application of the ordinary terms used by naturalists at that day.

As the work in which the name of *Roccus* was first published is very rare and inaccessible, the remarks of Mitchill on his *Roccus striatus* have been extracted to show the character of the work. We are indebted to Mr. Brevoort for the loan of the volume.[*]

"It has seemed to me proper to make a new genus for this fish and his congeners. He has been supposed by some to be the *Perca nobilis,*[†] but the position of his ventral fins forbids him to be considered as a *Perca* at all. Besides, if he was a member of the *Perca* family, the specific character of 'eight brown bands' is totally different from the longitudinal stripes that distinguish him, and would rank him among the undescribed species. Besides, he has two dorsal fins, while the *P. nobilis* has but one."

In the first place, the so-called *Roccus striatus* does not differ from the very common European Perch, and from the numerous allied species and genera, in the position of the ventrals.

In the next instance, even if it did so differ, Mitchill had, on a previous page, founded a genus for the same reason as in the case of *Roccus,* and he has given no indications whatever as to how the two are to be generically distinguished.

The two species that are referred to *Roccus* belong to totally distinct families.

Finally, the "*Roccus striatus*" had been indicated previously in four different works.

The name *Roccus* is itself a barbarous latinization of the popular name "Rockfish", or simply "Rock", by which its chief species is known in some parts of the United

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[*] Report, in part, of Samuel L. Mitchill, M. D., Prof. of Natural History, &c., on the Fishes of New York. New York: printed by D. Carlisle, No. 301 Broadway, January 1, 1814. 16mo, 28 pages.

[†] It is not in any way related to the *Perca nobilis.* According to Cuvier and Valenciennes, that species is the *Chætodon octofasciatus* of Bloch.

States, especially in the District of Columbia, Maryland, and Philadelphia. It has been nevertheless deemed advisable to accept the name rather than to apply a new one. It is scarcely worse than *Lumpus, Gunnellus, Vogmarus, Kangarus, Catus, Rattus*, and many other names of similar derivation, which have been introduced into systematic nomenclature.

C. S. Rafinesque, in the "Ichthyologia Ohiensis", also proposed for his *Perca chrysops,* in case it should be found to be generically distinct from *Perca*, the name *Lepibema.* He believed it to be distinguished "by the scaly bases of the caudal, anal, and second dorsal fins, the last with some spiny rays, and all the three parts of the gill-cover more or less serrulate, besides the small teeth". Rafinesque suggested that to this genus the *Perca Mitchilli* of Mitchill might "perhaps be found to belong".

The distinctive characters mentioned by Rafinesque alone are very trivial; but *Roccus* is certainly distinguished by the presence of scales between the rays of the second dorsal and anal fins from *Perca*, in which the membrane is perfectly naked. But the opercula are not more completely armed than in *Perca*, nor is there any essential difference in the size of the teeth.

ROCCUS LINEATUS, Gill.

Synonymy.

Sclæna lineata *Bloch*, Ichthyologie, pars ix, p. 53, pl. 305.
Perca . . . . . *Schœpff*, Schrift. der Gesells. Nat.-Freunde, vol. viii, p. 160.
Perca saxatilis *Walbaum*, Artedi Genera Piscium, p. 330.
Perca saxatilis *Bloch*, Systema Ichthyologiæ Schneid. ed., p. 89.
Perca septentrionalis *Bloch*, Systema Ichthyologia Schneid. ed., p. 90, pl. 70.
Centropome rayé *Lac.*, Hist. Nat. des Poissons, vol. iv, p. 225.
Roccus striatus *Mitchill*, Report. in part, on the Fishes of New York, p. 25, 1814.
Perca Mitchilli *Mitchill*, Trans. Lit. and Phil. Soc. N. Y., vol. i, p. 413, pl. 3, fig. 4.
Rock Fish *Mease*, Trans. Lit. and Phil. Soc. N. Y., vol. i, p. 502.
Perca Mitchilli
Lepibema Mitchilli } *Raf.*, Ichthyologia Ohiensis, p. 23 (passim).
Labrax lineatus *Cuvier* and *Val.*, Hist. Nat. des Poissons, vol. ii, p. 79.
Perca labrax! *Smith*, Nat. Hist. Fishes of Mass., p. 277.
Labrax lineatus *Rich*, Fauna Boreali-Americana, vol. iii, p. 10.
Labrax lineatus *Storer*, Report on the Fishes of Mass., p. 7.
Labrax lineatus *Ayres*, Boston Journ. Nat. Hist., vol. iv, p. 707.
Labrax lineatus *De Kay*, Zoölogy of N. Y. Fishes, p. 7, pl. 1, fig. 3.
Labrax lineatus *Linsley*, Catalogue of Fishes of Connecticut.
Labrax lineatus *Storer*, Synopsis Fishes of N. America, p. 21; ib. in Memoirs Am. Acad.
Labrax lineatus *Storer*, Hist. Fishes of Mass.; ib. in Memoirs Am. Acad. vol. v, p. 55, pl. 1, fig. 4, 1853.
Labrax lineatus, *Baird*, Report on Fishes of New Jersey Coast, p. —; ib. in Ninth Annual Report of Smith. Inst., p. 321.
Labrax lineatus *Holbrook*, Ichthyology of South Carolina, p. 17, pl. iv, fig. 2.
Labrax lineatus *Gill*, Annual Report Smith. Inst., 1857, p. 255.
Labrax lineatus *Günther*, Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum, vol. i, p. 64.
Roccus lineatus *Gill*, Proceedings Acad. of Natural Sciences of Phila., 1860, p. 64.

ROCCUS CHRYSOPS, Gill.

Synonymy.

Perca chrysops
Lepibema chrysops } *Raf.*, Ichthyologia Ohiensis, p. 28.
Labrax multilineatus *Cur.* and *Val.*, Hist. Nat. des Poissons, vol. iii, p. 588.
Perca multilineata *Les.*, *fide Cur.*, and *Val.*
Labrax notatus *Smith*, in Rich. Fauna Boreali-Americana, vol. iii, p. 8, 1836.
Labrax multilineatus *Kirtland*, Boston Journal Nat. Hist., vol. v, p. 21, pl. 7 fig. 1; Visitor, p. 53, 1859.

LABRAX MULTILINEATUS *De Kay*, Nat. Hist. of New York Fishes, p. 14.
LABRAX ALBIDUS *De Kay*, Nat. Hist. of New York Fishes, p. 13, pl. 51, fig. 165.
LABRAX NOTATUS *De Kay*, loc. cit., p. 14.
LABRAX MULTILINEATUS *Storer*, Synopsis of the Fishes of North America, p. 22; ib. in Memoirs of American Acad., vol. ii.
LABRAX NOTATUS *Storer*, loc. cit., p. 22.
LABRAX ALBIDUS *Storer*, loc. cit., p. 23.
LABRAX OSCULATII *Filippi*, Revue et Magazin du Zoologie, 2d series, vol. v, p. 164.
LABRAX CHRYSOPS *Gill*, Proc. Acad. Nat. Sci. Phila., 1860, p. 20.
LABRAX OSCULATII *Günther*, Catalogue of the Acanthopterygian Fishes, &c., p. 65.
LABRAX MULTILINEATUS *Günther*, Catalogue of the Acanthopterygian Fishes, &c., p. 67.
ROCCUS CHRYSOPS *Gill*, Proceedings Acad. of Nat. Sciences of Phila., 1860, p. 113.
Not LABRAX CHRYSOPS *Girard*.
Not LABRAX MULTILINEATUS (partim) *Günther*, Catalogue of the Acanthopterygian Fishes, &c., p. 501.

The body is elongated-ovate, with the dorsal outline arched. The height is greatest under the spinous dorsal fin, and there equals twenty-seven hundredths of the entire length from the projecting lower jaw to the concave margin of the caudal fin. The height is nearly uniform under the spinous dorsal; the dorsal outline behind that fin slowly declines to the end of the second dorsal; the abdominal outline ascends much more rapidly from the commencement to the end of the anal fin. Behind the latter fin, the height of the caudal peduncle is about a seventh of the entire length; at the base of the caudal fin, it is equal to a ninth of the same.

The head is conical in profile, slightly depressed at the nape, and thence descends in nearly a straight line to the snout, the latter being scarcely convex. The head, from the lower jaw to the tip of the opercular spine, forms little more than a quarter of the entire length; its height at the nape behind the vertical of the posterior border of the eye is nearly equal to sixteen hundredths of the entire length. The diameter of the eye is more than equal to a quarter of the head's length, and the eye is distant a diameter from the snout.

The pectinated margin of the preoperculum is slightly oblique; its teeth become stronger toward the angle, and are continued on the inferior margin at greater distances for about half the distance between the angle and the articulation with the lower jaw; the anterior limb or margin of the anterior fold is vertical. The operculum has two spines, separated by an oblique emargination.

The first dorsal fin commences over the bases of the ventrals, and is of a triangular form. The fourth spine is longest, and equals an eighth of the fish's length; from thence they gradually decrease in size to the ninth, which is nearly as large as the second. The second dorsal is entirely separated from the first. Its spine is equal to nearly half the length of its longest ray, and somewhat exceeds that of the seventh spine; the last ray is less than half as long as the longest.

The anal fin commences nearly under the fourth ray of the dorsal, and nearly four of its rays are posterior to the end of that fin; the third spine is longest, and exceeds half the length of the first articulated or longest ray. The relative height is the same as that of the dorsal fin.

The caudal fin, when expanded, is emarginated, and its shortest rays form a sixth of the entire length; the longest rays equal a quarter of the same.

The pectoral fins are small, and only equal fifteen hundredths of the length. The first two rays are simple; the third, or longest, is branched.

The ventrals are longer than the pectorals, and equal seventeen hundredths of the length. The spine is more than half as long as the first branched or longest ray.

The number and arrangement of the rays of the respective fins are indicated by the following formula:

D. IX + I. 1. 11; A. III. 1. 9; C. 5. I. 8. 7. I. 4; P. 2. 14; V. 1. 5.

The scales of the trunk are of moderate size, with the nucleus at about the posterior third; thence about ten ridges radiate toward the posterior margin, which is crenated by them. Numerous muricated ridges, terminating in pectinations at the posterior margin, also radiate posteriorly from the same nucleus. The concentric striæ are fine but well marked. The number of scales through which the lateral line passes amounts to from fifty-three to fifty-six, exclusive of the smaller ones at the base of the caudal fin. The number of rows is nine above the lateral line, one through which the lateral line runs, and fourteen below.

The operculum is covered with moderate scales, which have subcentral nuclei and muricated and pectinated posterior margins. Those on the cheeks are much smaller, with the nuclei also subcentral, but with generally entire, or nearly entire, margins. Some of the larger scales near the posterior margin of the preoperculum are pectinated like the opercular ones.

There are on the lower jaw five pairs of indistinct, shallow, muciferous grooves; those of the third and fourth pairs are elongated, the last being under the terminal part of the maxillaries. The fifth pair is obsolete. The maxillaries, on their superior parts, are covered with scales smaller than those of the cheeks; the inferior and posterior portions are naked.

The color is silvery, tinged with golden on the sides below the lateral line, and above with rose. A number of blackish or dusky lines traverse the sides, four of which are above the lateral line; through a fifth the lateral line runs; and there is a variable number of more or less distinct ones below. The head is dark above and silvery on the sides.

The spinous dorsal is punctulated with black, and has a narrow black margin. The soft dorsal is also punctulated. The anal is blackish at its middle and margin between the rays. The caudal is similar to the dorsal. The pectorals and ventrals are immaculate.

The *Roccus chrysops* thus described is undoubtedly identical with the *Perca* or *Lepibema chrysops* of Rafinesque, and the *Labrax multilineatus* of the "Histoire Naturelle des Poissons" and of Kirtland. The descriptions that have been given of the species under those names are meager and unsatisfactory; but the notice of the color given by the above-named authors, and the possession of specimens from the same hydrographical basins as those from which the fishes described by them were taken, leave no doubt as to the identity of the species.

Rafinesque's description of his *Perca chrysops* is, like almost all his descriptions, inapplicable to any known fish, but it agrees with the *Morone chrysops* better than any other species. Rafinesque erroneously attributes to his species six branchiostegal rays, a single opercular spine, eight spines to the first dorsal fin, and places it under the genus *Perca*, all the species of which, he informs us, have naked heads. He suggested for it a new genus, for which he proposed to give the name *Lepibema*, in allusion to the scaly bases of the unpaired fins. Lesueur subsequently sent to the Parisian Museum two specimens of a species which he called *Perca multilineata*, which Cuvier and Valenciennes placed in their genus *Labrax*, adopting for it the specific name of Lesueur. Their description is mostly comparative, it being said to differ from the *Labrax lineatus* by its higher body, shorter head, more feeble teeth, the stronger asperities of the tongue, and especially the larger scales of the maxillaries, which resemble those of *Labrax mucronatus*, while in *Labrax lineatus* they were said to be scarcely perceptible.

The description of the lingual dentition is very unsatisfactory, and no correction is made of the statement made in the second volume that the *Labrax lineatus* has only lateral teeth. It is not so much in the development of the asperities of the tongue that the lingual dentition of the species differs, as in that, while there are two narrow rows separated by a mesial line in *Roccus lineatus*, the rows are broader at the middle in proportion, and coalescent in *Roccus chrysops*.

There were said to be in one specimen sixteen, and in another nineteen, longitudinal dark lines. So large a number is rarely seen; the most constant arrangement is five above, including the one through which the lateral line runs, while sometimes there are several below the lateral line, and at other times they are obsolete. These lines are sometimes straight, but often interrupted.

In the "Fauna Boreali-Americana" of Richardson, a *Labrax* is described in the volume on Ichthyology, under the name *Labrax notatus* (Smith), the Bar-fish, or "Canadian Basse". This species is said to "differ from Mitchill's Basse (*L. lineatus*, Cuvier) in being much more robust, and in being marked with rows of spots, five above and five below the lateral line, so regularly interrupted and transposed as to appear like ancient church-music". It has been suggested by Dr. De Kay that it is the same as the *Perca Mitchilli* var. *interruptus* of Mitchill, but the comparison will apply very well to *Roccus chrysops*, and it is doubtless identical with that species. In the remarks upon the species, it is said, by Dr. Richardson apparently, that "in the more robust form, and in the strong scales of the head, the Canadian Bar-fish resembles the *L. mucronatus* of the United States and the West Indies, and the *L. multilineatus* of the Wabash. The latter has sixteen narrow, black, longitudinal lines on the flanks." It has been attempted to show that the number of lines is not a specific character; and if this is the case, the *Labrax notatus* and *L. multilineatus* are probably identical with each other and with *Roccus chrysops*. The *Labrax notatus*, it is true, is stated by Smith to have but one anal spine and six articulated ventral rays; but this statement is undoubtedly due to a *lapsus calami*, or an error of observation. So great a variation in the number of anal spines, from a nearly allied species, would be in direct opposition to all we know of the peculiarities of the fishes of this tribe, while it is one of the characters of the family to have only five branched rays in the ventral fins. Smith states that he counted fifty-eight scales along the lateral line, a statement which confirms the identity of his species with *Roccus chrysops*.

In the abstracts of Smith's description of *Labrax notatus*, given by De Kay and Storer, the species is said to have the "length, one to two feet". Even if this was so, it would not militate against the idea of its identity with *Roccus chrysops*, although usually large, but an examination of the description of Smith and Richardson reveals no mention whatever of the size of the species.

In the number of Guerin's "Revue et Magazin de Zoologie" for April, 1853 (vol. v, p. 164), Professor Filippi, of Turin, has described a *Roccus*, to which he has given the name of *Labrax Osculatii;* a traveler in America, M. Osculati, having obtained it from Lake Ontario. Filippi has distinguished this species from *Labrax lineatus* very well, alluding to the two longitudinal lines of basal teeth in that species, and attributing to his own a single oval patch. His other characters are the greater height of the body in *L. Osculatii*, which equals a third of the length, while in *L. lineatus* it is a quarter, and the number of scales, which are formulated as $56\frac{9}{15}$ for *L. Osculatii* and $64\frac{9}{11}$ for *L. lineatus.* The true teeth are also said to be more numerous. The distinctive characters of the species are very well stated by Filippi, but his expression of surprise that a fish so common in the United States should not have been noticed by any American naturalist, not even by Dr. De Kay, is uncalled for. Unhappily, the species had been too often noticed, and in De Kay's Ichthyology of New York it appears under no less than three different names. Filippi has mentioned its habitat as the sea and rivers of the United States (*mare et fluviis Confederationis Americanæ*). I know not on what authority it is said to inhabit the sea. It is probably assumed to be found there because the *Roccus lineatus* is. So far as we know, it is confined to the great fresh-water lakes and the western rivers.

As Filippi has already led one naturalist into error regarding the proportions of the species, it seems necessary to state that he must have reckoned the length only from the snout to the base of the caudal fin, and not to its margin. When so measured, the height is a third of the length, but its height in proportion to the total length is only as three to ten.

Specimens of the *Roccus chrysops* are in the museum of the Smithsonian Institution, from Southern Illinois, obtained by Mr. Robert Kennicott, and from the Root River, at Racine, Wis., Toronto, &c., obtained by Professor Baird. It appears to be generally distributed in the rivers of the West.

The specimens from the hydrographical basins of the Ohio River and of the Great Lakes cannot be specifically distinguished from each other; nor can I perceive the difference signalized by Dr. Kirtland in the caudal fins of Ohio and Lake Erie specimens.

In extreme youth, this species appears to be crossed by obscure vertical bands. At a later epoch, these bands are lost, and afterward the longitudinal lines are assumed.

The best descriptions of this species have been published by Professor Filippi under the name *L. Osculatii*, and by the late Dr. De Kay under that of *L. albidus.* The best figure is that given by Dr. Kirtland in the Journal of the Boston Society of Natural History; but the dorsals are erroneously represented as being connected by a low membrane. In the text, they are correctly described as being "distinct".

It is with much hesitation that I have adopted the specific name of Rafinesque. It would have been better for the progress of the science if all the works of that unfortunate naturalist had been ignored.

GENUS MORONE, GILL.

Synonymy.

MORONE *Mitchill*, Report in part on the Fishes of New York, p. 18. (Not defined.)
MORONE *Gill*, Proceedings Academy of Nat. Sciences of Phila., 1860, p. 115.
PERCA sp. *Bloch*, Gmelin, Lac.
CENTROPOMUS sp. *Rafinesque.*
BODIANUS sp. *Mitchill.*

Labraces with a pectinated preoperculum, strongly ctenoid cheek and opercular scales, lingual teeth developed only in a marginal band, and skull with swollen diaphanous brain-case and mastoid protuberances projecting toward the foramina for the last two branches on each side of the fifth nerve.

The body is oblong-ovate and slightly gibbous at the commencement of the dorsal fin.

The head is compressed, laterally oblong-conic. The operculum has two spines, the upper of which is smaller; the preoperculum pectinated behind and beneath; the suborbital bones entire. The muciferous cavities of the lower jaw are very perceptible.

The teeth on the intermaxillary, dentary, vomerine, and palatine bones are villiform. There is only a marginal band on the tongue, which is less perfect at the tip, the asperities being there more scattered. The interbranchial osselets are smooth.

The scales are ctenoid on the body and the entire head.

The lateral line anteriorly convex, but not parallel with the back.

The dorsal fins are united by a low membrane; the anterior has nine spines; the posterior, one. The anal fin has three spines. The caudal is emarginated.

The skull has the brain-case with inflated sides below, swollen and developing into mastoid prominences projecting toward the foramina for the last two branches of the fifth pair of nerves, no vacuity between the basioccipital and alisphenoid bones, and the postfrontals laterally contracted.

The chief distinctive characters of the genus are the presence of strongly-pectinated scales on the cheeks and opercular bones, and the band of villiform teeth on the sides, and of more scattered ones at the tip, as well as the cranial peculiarities.

In the armature of the preoperculum and operculum, it resembles the genus *Roccus*. The slightly gibbous back in front of the dorsal fin and the greater development of the second anal spine are secondary features, which support the natural characters of *Morone* as distinguished from the genus *Roccus*.

For the name of the genus, one used by Mitchill for a group founded in error has been adopted. The name of Mitchill resulted from a misunderstanding of that author regarding the value of the terms made use of by Linnæus. The genus *Perca* was placed by the Swedish naturalist in his section of *Thoracici*. Mitchill, believing that the *Morone americana*, *Perca americana* (*Perca flavescens* Cv.), and *Pomotis aureus* (*Pomatis vulgaris* Cv.), were rather abdominal fishes, considered them to be generically distinct from *Perca*, and consequently gave to them the generic name *Morone*. It is scarcely necessary to state that all the species enumerated have the normal position of the ventrals of *Perca*, and that therefore *Morone* of Mitchill was a mere synonym of

Perca of Linnæus. I have nevertheless chosen to take that name rather than to give a new one.

At least two species are now known of the genus *Morone*. One of them is the well-known "White Perch" of the eastern coast; the other is our *Morone interrupta*, a species that had been erroneously described under the name *Labrax chrysops*.

The synonymy of each species will be given, but a description is only offered of the *Morone interrupta*.

MORONE AMERICANA, GILL.

Synonymy.

PERCA *Schoepff*, Schrift. der Gesells. Nat.-Freunde, vol. viii, p. 159.
PERCA AMERICANA *Gmel.*, Systema Naturæ, vol. i, pars iii, p. 1308.
PERCA *Schoepff*, Naturforscher, vol. xx, p. 17.
PERCA IMMACULATA *Walbaum*, Artedi Genera Piscium, p. 330.
PERCA AMERICANA *Bloch*, Systema Ichthyologiæ, Schneid. ed.
PERCA AMERICANA *Lac.*, Hist. Nat. des Poissons, vol. iv, p. 412.
MORONE RUFA *Mitchill*, Report, in part, on the Fishes of New York, p. 18.
BODIANUS RUFUS *Mitchill*, Trans. Lit. and Phil. Soc. of New York, vol. i, p. 420, Jan., 1814.
BODIANUS RUFUS, Centropomus albus Raf.; Précise des découvertes Somiologiques, p. 19, June, 1814.
PERCA MUCRONATA *Raf.*, American Monthly Magazine and Critical Review, vol. ii, p. 205.
LABRAX MUCRONATUS *Cuv.* and *Val.*, Hist. Nat. des Poissons, vol. ii, p. 81, pl. 121.
BODIANUS RUFUS *Smith*, Nat. Hist. Fishes of Mass., p. 274.
LABRAX MUCRONATUS *Storer*, Report on Ichthyology of Mass., p. 8.
PERCA MUCRONATUS (misprint) *Sw.*, Nat. Hist. of Fishes, Amphibious and Reptile, vol. ii, p. 198, 1839.
LABRAX RUFUS *De Kay*, Nat. Hist. of New York Fishes, p. 9, pl. 3, fig. 7.
LABRAX MUCRONATUS *Ayres*, Boston Journal Nat. Hist., vol. iv, p. 257.
LABRAX MUCRONATUS *Linsley*, Catalogue of Fishes of Connecticut.
LABRAX RUFUS *Storer*, Synopsis of the Fishes of North America, p. 22; ib. in Memoirs of American Academy, new series, vol. ii, p. 274, 1846.
LABRAX RUFUS *Storer*, Hist. of the Fishes of Mass., p. 1; ib. in Memoirs of American Acad., new series, vol. v, p. 57.
LABRAX MUCRONATUS *Baird*, Report on Fishes of New Jersey Coast, p. 8; ib. in Ninth Annual Report of Smith. Inst., p. 322, 1855.
LABRAX AMERICANUS *Holbrook*, Ichthyology of South Carolina, p. 21, pl. 3, fig. 2, 1855.
LABRAX RUFUS *Gill*, Annual Report of Smith. Inst., p. 256, 1857.
LABRAX MUCRONATUS *Hill*, Catalogue of Fish of Jamaica, p. 1.
LABRAX RUFUS *Günther*, Catalogue of the Acanthopterygian Fishes of the British Museum, p. 65.
LABRAX NIGRICANS *De Kay*, Nat. Hist. of New York Fishes, p. 12, pl. 50, fig. 160, 1842.
LABRAX NIGRICANS *Storer*, Synopsis of the Fishes of North America; ib. in Memoirs of American Acad., vol. ii, p. 23, 1846.
GRYSTES NIGRICANS *var.* 1 *Herbert*, Frank Forrester's Fish and Fishing in the United States, vol. i, p. 191.
MORONE PALLIDA *Mitchill*, Report, in part, on the Fishes of New York, p. 18.
BODIANUS PALLIDUS *Mitchill*, Trans. Lit. and Phil. Soc. of New York, vol. i, p. 420.
BODIANUS PALLIDUS *Smith*, Nat. Hist. of Fishes of Mass., p. 294.
LABRAX PALLIDUS *De Kay*, Nat. Hist. of New York Fishes, p. 11, pl. 1, fig. 2, 1842.
LABRAX PALLIDUS *Storer*, Synopsis of the Fishes of North America, p. 22; ib. in Memoirs of American Acad., vol. ii, p. 22.
LABRAX PALLIDUS *Perley*, Report upon the Fishes of the Bay of Fundy, p. 121, 1851.
LABRAX PALLIDUS *Perley*, Descriptive Catalogue (in part) of Fishes of New Brunswick and Nova Scotia, p. 4; ib. in Reports on Sea and River Fisheries of New Brunswick, p. 182, 1852.
LABRAX PALLIDUS *Günther*, Catalogue of the Acanthopterygian Fishes of the British Museum, p. 67.

The history of this species and its nomenclature has been fully discussed in the monograph published in the Proceedings of the Academy of Natural Sciences. It is therefore unnecessary to reproduce it in this report, the species not being an inhabitant of those regions traveled over by the expedition under Captain Simpson.

Günther has recently, in his "Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum", retained the *Labrax pallidus* and *Labrax rufus* as distinct species. We see no reason to change our opinion concerning their identity expressed in our monograph.

MORONE INTERRUPTA, GILL.

Synonymy.

LABRAX CHRYSOPS *Girard*, General Report upon the Zoölogy of the several Pacific Railroad routes, Ichthyology, p. 29 (pl. xi, figs. 1–4).
LABRAX CHRYSOPS *Girard* (figured in Governor Stephen's Report).
MORONE INTERRUPTA *Gill*, Proceedings Acad. of Nat. Sciences of Phila., 1860, p. 118.

The body is oblong ovate, with the back at the commencement of the dorsal fin slightly gibbous. The greatest height under the spinous dorsal equals three-tenths of the length from the snout to the concave margin of the caudal fin. The dorsal outline slightly declines under the spinous dorsal and little more under the rayed. The abdominal outline to the anal fin is convex, and thence ascends quite rapidly in a concave curve to the base of the caudal fin. The peduncle behind the anal fin exceeds a seventh of the extreme length, and at the base is equal to about a ninth.

The head is conical in profile, slightly depressed at the nape, and thence nearly straight to the snout. The head from the snout to the opercular spine forms three-tenths of the length, its length being scarcely less than the height of the body. The eyes are moderate, the diameter being between a fourth and a fifth of the head's length. They are distant much more than a diameter from the snout.

The anterior margin of the preoperculum advances obliquely downward and forward; the pectinate margin is nearly vertical; the distance between the margins near the angle exceeds half the diameter of the eye. The teeth of the posterior margin become stronger toward the angle; the inferior margin is weakly serrated along its posterior half. The operculum has two spines, separated by an oblique sinus; the superior one is blunt and almost rounded.

The dorsal fin commences at a vertical intermediate between the bases of the pectoral and ventral fins and is of a triangular form, the fourth ray being the largest and equaling the length of the pectoral fin; the spines have the same form and arrangement as those of *Morone americana*. The second dorsal is connected by a membrane as in *Morone americana;* its spinous or first ray is little more than half the length of the first articulated one, which itself is nearly as long as the fourth dorsal spine; the fin thence decreases in height toward its last ray, which is shorter than the spinous ray.

The anal fin commences under the fourth or fifth articulated ray of the second dorsal, and about four of its rays are posterior to the termination of that fin; the first spine is short and robust; the second almost two and a half times longer, compressed, and very strong; the third is almost as long as the second, but much more slender. The first articulated ray of the anal is longer than the spines, and about twice as long as the last; the outline of the fin is slightly emarginated.

The first ray of the pectoral fin is, as usual, articulated, but simple; the third is longest and branched, and equals the base of the second dorsal.

The ventrals are about as long as the pectorals; the length of the spine is equal to two-thirds of that of the first or second branched rays.

The radial formula is as follows:

D. IX. I. 12; A. III. 10; C. 4. I. 8. 7. I. 3; P. 2. 14; V. 1. 5.

The scales are of about the same size as in the *Morone americana*, the lateral line running through about fifty besides the smaller ones at the base of the caudal fin; at the region of its greatest height, there are about nineteen rows, of which about one small and six large ones are above the lateral line and eleven beneath. The relative proportions on the different parts of the body are nearly the same as in that species, the chief difference existing on the front of the back, where the exposed portions of the disk are higher and narrower than in *M. americana.* On the cheeks from the orbit to the angles, there are seven oblique rows.

Those on the body are mostly higher than long, with the nucleus at about the posterior two-thirds, with numerous radiating, slightly terminally, muricated, ridges advancing posteriorly, and ending in teeth. About seven radiating ridges advance forward, some of them terminating at the anterior margin within the angles. These are crossed by numerous elevated concentric lines, parallel with the margins. The scales on the sides of the head and between the eyes are also pectinated like those of the body.

The lower jaw has five pairs of mucous pores as in *M. americana,* the fourth pair being largest and deepest, and under the terminal portion of the maxillaries; thence they regularly decrease in size to the anterior pair, which is on each side of the symphysis. The fifth pair is at the articulation of the jaw with the preoperculum, and is continued from the two inferior borders of that bone.

The specimens preserved in spirits have a bright, brazen color, tinged on the back with olivaceous. Along the sides are seven very distinct longitudinal black bands, through the fourth of which the lateral line runs for its entire length. The continuity of the bands below the lateral line is interrupted at the posterior half of their length, and they there alternate with their anterior parts.

The dorsal fins are tinged with purple, and the margin of the spinous one is dark. The anal is of a darker purple toward its anterior angle. The caudal, especially posteriorly and at its middle, is purple. The rays of the pectoral and ventral fins are yellowish, while the membrane of the former is hyaline, and of the latter sometimes minutely dotted.

This species, as will be observed by reference to the synonymy, has been described by Dr. Charles Girard, under the name of *Labrax chrysops* Girard (*Perca* or *Lepibema chrysops* Raf.), to which is also referred, as a synonym, the *Labrax multilineatus* of Cuvier and Valenciennes, Kirtland, De Kay, and Storer. From that species, it is very distinct, and even belongs to a different genus. Cuvier described the ground-color as a greenish-gray on the back and silvery on the belly. This is not the color of *Morone interrupta,* and that species must be therefore distinct from *Labrax multilineatus,* nor can it be the *Perca chrysops* of Rafinesque, which is said to be "silvery with five longitudinal brownish stripes on each side", and have the "head brown above". The description of the *Perca chrysops,* though erroneous in most respects, is as accurate as Rafinesque's generally are, and agree sufficiently well with Kirtland's *Labrax multilineatus,* which is doubtless identical with the Cuvierian species. Even such an observer as Rafinesque would have noticed the deep brazen hue of *Morone interrupta,* and would not have overlooked two of the seven very distinct black bands that run along the sides.

Dr. Girard has stated that there are but six branchiostegal rays in his species; but

I am able to say, from an examination of the specimens used by Dr. Girard himself for description, that it agrees with all allied species in having the normal number of seven, which are developed as in *Morone americana*.

There are preserved in the museum of the Smithsonian Institution three specimens of the *Morone interrupta*, one of which was obtained by Lieutenant Couch at New Orleans, and two larger ones were found at Saint Louis, Mo., by Dr. George Engelmann. The small specimen from New Orleans differs from the two Missouri specimens by the larger second spine of the anal fin, but in every other respect they are similar.

FAMILY COTTOIDÆ, (RICH.).

SUBFAMILY COTTINÆ, (BON.).

GENUS POTAMOCOTTUS, GILL.

Synonymy.

POTAMOCOTTUS *Gill*, Proc. Boston Soc. Nat. Hist.
COTTUS sp. *Agassiz*, Lake Superior, &c.
COTTUS sp. *Girard*, "Monograph of the Cottoids of North America" in Smithsonian Contributions to Knowledge, vol. iii.

Body elongated, anteriorly subcylindrical, and thence declining in height toward the caudal, where it is also much compressed. The skin is perfectly smooth and naked, except sides behind the pectorals.

Head conical or cuneiform in profile, oval above and depressed, and covered by a naked skin. The preoperculum is armed at its posterior margin with a strong spine, curved upward, and below with one or two smaller ones, or tubercles; the antero-inferior angle of the sub-operculum is also armed with a spine directed forward and downward. The other bones are unarmed.

Eyes mostly situated in the anterior half of the head; frontal bones between them of moderate width.

Mouth slightly oblique, and its gape is quite large.

Teeth villiform on the jaws and vomer as well as palatine bones.

Branchial apertures vertical and oblique, entirely separated from each other by a perfect isthmus, as wide or wider than the interval between the bases of the ventrals. There are six branchiostegal rays.

Dorsal fins two, either entirely separate or connected by a low membrane. The first has from six to nine slender spines.

Pectorals rounded, and their rays generally unbranched.

Ventrals nearly under the pectorals, and have a spinous and four (rarely three) unbranched rays.

The genus *Potamocottus* in every respect resembles the *Uranidea*, except in the presence of a band of villiform teeth on each palatine bone. Several species properly referable to this subgenus have been described as true *Cotti*. It is equally closely related to the genus *Cottopsis* of Girard, but is distinguished by its smooth skin. The species named by Girard *Cottopsis gulosus* is a true *Pottamocottus*.

The propriety of retaining the species with palatine teeth in the genus *Cottus* appears to be questionable. Dr. Girard, in his monograph of the genus, published by the Smithsonian Institution, has asserted that when young some species of *Cottus* "exhibit teeth-like asperities on the palatines. This occurs chiefly amongst those having four jointed rays to the ventrals: in *C. Wilsonii*, *C. Bairdii*, and *C. Meridionalis*. *C. gracilis* is the only one of the division with three jointed rays where similar asperities have been noticed." This assertion has not, however, been confirmed by my investigations. An examination of the types of the *Cottoids* described by Dr. Girard, in his "Monograph", has demonstrated that the presence or absence of teeth in the palatine bones is constant in the various species. In the *Cottus Richardsonii*, *C. Wilsonii*, and *C. meridionalis*, teeth are always found on the palatines, in the oldest as well as the youngest individuals. The *Cottus Bairdii* cannot be at present found; but the same is doubtless the case with that species. Many other specimens preserved in the Smithsonian Museum exhibit the same constancy in their dentition.

As to the *Cottus gracilis*, it is said by Dr. Ayres, in his Memoir on the Identity of the North American *Cotti* with the *Cottus gobio* of Europe, that of the very numerous specimens of the Connecticut *Cottus* (*C. gracilis* Heckel), which he had examined, he had seen a single one in which there were a few scattered teeth on the palatines, like those of the vomer; in others, those bones were edentulous. It is probable that that instance is alluded to by Dr. Girard in his mention of palatine teeth having been discovered in the *Cottus gracilis*. An isolated fact like that recorded by an observer who has failed to appreciate the distinctive characters of species of this group cannot, however, be urged as a valid objection to the importance of such characters. Nor could the circumstance that some *Cotti* have teeth when young, which they lose with age, militate against assigning a certain value to a plan of dentition which is constant through life, as well in the young and old. The difference of development alone would be a character of importance. But there does not appear to be even such difference between the dentition of the young and old. In those specimens which Dr. Girard described, the dentition is constant. Palatine teeth are even found in individuals which are much larger than any without. Such is the case with the species now under consideration; such is the case with other species equally large from the Western States.

If the above views are correct, it would then appear to be advisable to separate the *Cotti* with palatine teeth, and place them in another genus, or, at least, a subgenus, to which the name of *Potamocottus* may be given. This group will embrace the *Cottus punctulatus* as its type, and, in addition, *Cottus meridionalis* Girard, *C. Bairdii* Girard, *C. Wilsonii* Girard, and *C. Richardsonii* of Agassiz, as well as *Cottopsis gulosus* of Girard. The genus *Potamocottus* would bear the same relation to *Uranidea* that *Bryttus* does to *Pomotis*, or *Scorpæna* to *Scarpænopsis* of Hoeckel.

The genera *Uranidea*, *Potamocottus*, and *Cottopsis* agree very closely together, both in superficial and anatomical characters, and differ in the most decided manner from *Cottus* and the related genera; to express this divergence, the genera in question should be segregated in a group which may be named *Uranideæ*.

POTAMOCOTTUS PUNCTULATUS, Gill.

The general form of the body is similar to that of the first division of the first section of Girard's *Cotti*. It is elongated, slender, and considerably compressed. Of the extreme length, the head forms three-tenths parts and the caudal fin between a fifth and sixth. The trunk is anteriorly cylindrical, the height being scarcely more than the width behind the pectoral fins. The greatest height is at the commencement of the first dorsal fin, and exceeds a seventh of the extreme length; from thence, the height declines gradually to the caudal peduncle, where it is only equal to a third of the greatest. The breadth also declines uniformly, but more sensibly, to the base of the caudal, where it is very much compressed.

The head is much depressed, and rhomboidal-ovate above. From the snout to the membraneous margin of the operculum, it forms a third of the entirel ength. Its breadth is very great and is only about a sixth less than its length. The height at the occiput is about a half of the length. The snout is anteriorly broadly rounded.

The mouth is quite large; the jaws arched and receding; the distances between the extremities of the maxillaries being equal to the length of the caudal fin. The maxillary terminates under the anterior margin of the pupil. The upper jaw is somewhat protuberant beyond the lower.

The jaws are armed with bands of small, recurved, acute teeth; those on the dentaries are somewhat shorter than those of the premaxillaries, and reach much farther backward, extending to the angles of the mouth; the band is narrow as it recedes backward. At the symphysis of each jaw, there is a narrow interval, separating the bands into two equal parts. The chevron of the vomer and the palatines are also armed with bands of villiform teeth; those on the latter bones are perfectly evident, and almost as large as those of the vomer; they are in bands which are narrowed posteriorly.

The eyes are of the usual size, and situated about midway between the snout and the margin of the preoperculum. The width of the frontal bones between the eyes is about equal to the diameter of the orbit.

The preopercular spine is stout and directed obliquely backward and upward. The one below is small and pointed downward. On the inferior margin is another still smaller. The subopercular spine is moderate, acute, and directed forward.

The breadth of the isthmus separating the branchial apertures is equal to five-ninths of the length of the caudal fin. The branchiostegal bones are of the normal number of six.

The first dorsal has eight rays; the last is connected by a membrane decreasing in height to the second dorsal, where it is extremely low.

The anal fin has about the height of the second dorsal, and commences under its third ray.

The caudal forms between a fifth and sixth of the entire length. Its posterior margin, when fully expanded, is rounded; most of its rays are doubly bifurcated.

The pectorals extend backward to about the vertical of the sixth ray of the second dorsal; all of their rays are simple.

The radial formula is as follows:

D. VIII. 17; A. 13; P. 15; V. I. 4.

The lateral line, from the scapular bones to the end of the second dorsal fin, is well marked; it is then deflected and very obscure.

The color is grayish anteriorly and brownish posteriorly. It is covered with black spots, which, on the head and anterior portion of the body, are very small and numerous, but posteriorly are larger, confluent, and much fewer. The dorsal, caudal, and pectoral fins are quite thickly spotted on the rays; the rays of the anal have also a few spots. The ventrals are nearly immaculate.

This species is perhaps almost the only smooth American Uraneidid which can be at once readily distinguished. A single specimen was obtained by Dr. George Suckley, in the summer of 1859, between Bridger's Pass and Fort Bridger. It is four inches in length.

POTAMOCOTTUS CAROLINÆ, GILL.

By its general form, this species belongs to the group of which the *Potamocottus Richardsonii* is the type, and is nearly allied to that species.

The body is elongated, slender, and compressed. The head forms twenty-eight hundredths of the total length, and the caudal eighteen hundredths. The trunk is anteriorly subcylindrical, and its height equals the length of the caudal fin. The thickness at the base of the pectorals is as great or slightly greater than the height. From the region of greatest height, the body regularly declines to the caudal peduncle, whose height equals a third of the greatest. The breadth declines still more rapidly; at the anus, it is equal to little more than half of that at the base of the pectorals, or to a tenth of the total length.

The head is oval and depressed above. From the snout to the membranous opercular margin, it forms twenty-eight hundredths of the total length; its breadth is about a sixth less than the length. The profile, from the dorsal fin to the snout, is scarcely convex.

The mouth is large; the jaws arched and receding; the distance between the extremities of the maxillaries exceeds a sixth of the entire length, and nearly equals the length of the caudal fin. The maxillaries terminate under the posterior margin of the pupil. The upper jaw extends beyond the lower.

The jaws are armed with acute, curved, approximate teeth; the band on the intermaxillaries is almost entire, and extends with little diminution of width to the extremities of those bones. The band on the lower jaw is separated by a symphysial interval; it diminishes in width to the corners of the mouth. The vomerine and palatine bands are well developed, and about as large as that of the lower jaw.

The eyes are moderate, the longitudinal diameter of the orbit equaling a sixth of the head's greatest length. The distance between the center of the pupil and the snout equals a tenth of the entire length. The interorbital space is scarcely as great as the diameter of the orbit.

The preopercular spine is large, and curved upward; the two inferior are tubercular, the last one smallest. The subopercular spine is acute, and points obliquely forward and downward.

The interbranchial isthmus equals in width about four-ninths of the length of the caudal fin, or a twelfth of the total length.

The first dorsal has eight spines, and is connected with the second by a low membrane.

The anal fin commences under the third ray of the second dorsal.

The caudal fin forms eighteen hundredths of the total length.

The pectoral fins extend backward to the vertical of the third ray of the second dorsal fin; its median or fifth, sixth, and seventh rays are, in one specimen, on the left side, abnormally dichotomous; they are generally simple.

The longest ventral ray equals thirteen hundredths of the total length.

The number of rays and their arrangement are indicated by the formula—

D. VIII. 17; A. 12; P. 16; V. I. 4.

The lateral line is continued in an almost straight direction to the base of the caudal fin. The deflection under the end of the second dorsal is slight. The cutaneous keel in which the pores open is most developed posteriorly.

The color does not differ from that of the nearly allied species. There are four rather darker transverse dorsal bands, one under the first dorsal, two under the anterior and posterior parts of the second dorsal, and a fourth at the base of the caudal fin. The caudal fin and pectoral fins are banded or clouded with darker on the rays. The spinous dorsal is punctulated with darker, especially between the anterior rays. The remaining fins are hyaline. The head above is darker.

The *Potamocottus Carolinæ* is one of the largest species of the genus, and even exceeds the *Potamocottus punctulatus* Gill in size. It is most nearly allied to the *Potamocottus Richardsonii*, but slightly differs from it in the proportions of its parts, and more especially in the character of the lateral line. It is also found in a different hydrographical basin, the specimens described having been obtained by Prof. S. F. Baird, of the Smithsonian Institution, at Maysville, Ky., in the year 1852. They are now in the museum of the Smithsonian Institution, and numbered in the catalogue of fishes of the museum as 2859. The largest specimen is nearly six inches long.

SUBORDER EVENTOGNATHI, GILL.

FAMILY CYPRINOIDÆ, AGASS.

GENUS TIGOMA, GIRARD.

Synonymy.

TIGOMA *Girard*, Researches on Cyprinoid Fishes, &c., (p. 41, sep. copy) in Proceedings Academy of Natural Sciences of Philadelphia, vol. viii, p. 205, 1856.

The body is elongated-ovate or subfusiform in profile, and more or less compressed.

The scales are of moderate and nearly equal size on the different regions of the body. They extend forward to the nape and above the margin of the preoperculum.

The head is rather small, oblong-conical in profile, with a convex or subacuminate snout.

The eyes are of moderate size, and situated entirely in the anterior half of the head. The chain of suborbital bones is narrow.

The mouth is terminal, small or moderate, the maxillary bones ceasing under or near the anterior margins of the orbits; the periphery of the jaws is triangular, semi-elliptical, or oval.

The jaws are covered by thin lips; the lower lips are separated at the symphysis by a wide isthmus. There are no barbels.

The branchial apertures extend forward to or beyond the vertical of the preoperculum, and are separated by a rather narrow isthmus.

The dorsal fin commences near the posterior half of the body, or between the snout and end of median caudal rays. There are about twelve rays.

The anal is nearly intermediate between the bases of the ventral and caudal fins, and is of nearly the same size as the dorsal.

The pectoral fins are of moderate length, and their extremities are more or less rounded, and not acute.

The ventral fins are inserted under, or nearly under, the first rays of the dorsal fin; the first rays are of nearly equal length

The pharyngeal bones are well developed, curved above, and with the peduncles rather long or moderate. The teeth are compressed and hooked, with or without a grinding-surface, and disposed normally, in two rows; the primary one has four or five teeth, and the secondary (or deciduous?) one or two.

This genus belongs to a group of genera of which the *Leuciscus* of Europe is the type, and it is indeed very closely related to that genus. *Algansea* of Girard is scarcely distinct, differing simply because of the pharyngeal teeth being confined to a single row; and it is by no means certain whether this is a true or permanent character. To this genus *Tigoma* also belongs the so-called *Cheonda cærulea* of Girard, which differs from *Cheonda Cooperi* (the type of the genus) by its narrow suborbitals.

TIGOMA SQUAMATA, Gill.

The body is robust and subovate, compressed, and very gradually diminishing in width toward the caudal fin. The dorsal and abdominal outlines are nearly equally arched. The greatest height of the body before the dorsal and ventral fins equal three-tenths of the length from the snout to the end of the median caudal rays, and is twice as great as the greatest width.

The caudal peduncle is rather slender, and narrowest between the anal and caudal fins; the distance between the anal fin and the base of the caudal equals eighteen hundredths of the total length; the height behind the anal twelve hundredths, and that of its most slender pair ten hundredths.

The head is conical in profile, acutely rounded anteriorly, and with the periphery of the jaws elongated semi-elliptical. The jaws are even; the maxillary bones end at the vertical of the anterior border of the eyes. The length of the head from the snout to the margin of the operculum forms more than a quarter (twenty-eight hundredths) of the entire length; the distance from the same place to the scaly nape exceeds a fifth of the length. The dorsal surface of the head is posteriorly flattened, and anteriorly becomes slightly convex; the outline of the naked portion is elongated subconical, and gradually decreases in width; posteriorly equaling fifteen hundredths of the total length, and anteriorly, from cheek to cheek, one-tenth being scarcely more than the interorbital space.

The eyes are of moderate size, circular, and entirely lateral, but near the profile; they are situated anterior to the plane separating the anterior and posterior halves of the head, the suborbital ring being half-way; the diameter of the eye exceeds a sixth of the head's length (five twenty-eighths), and the center of the pupil is distant two diameters from the muzzle.

The dorsal fin commences midway between the muzzle and end of the median caudal rays. Its base equals a ninth of the total length, its anterior rays fifteen hundredths, and its last more than six hundredths.

The anal fin commences between the sixth and seventh tenths of the length, is smaller than the dorsal fin, and the disproportion between the anterior and posterior rays is less. The base equals an eleventh of the length, the anterior rays thirteen hundredths, and the posterior more than seven hundredths.

The caudal fin is furcate, and its lobes equal; the median rays constitute a ninth of the total length, and the longest equal a fifth.

The pectoral fins are rounded, the third and fourth rays being longest; they equal sixteen hundredths of the total length.

The ventral fins are also rounded, and the third branched ray longest. They are inserted under the first branched ray of the dorsal; their length equals thirteen hundredths of the total.

The number and character of the rays are indicated by the following formula:

D. 4. 7 ÷ A. 4. 6 ÷ C. 9. I. 9. 8. I. 8; P. 1. 14; V. 1. 9.

All the simple rays of the dorsal and anal fins, except the fourth, are rudimentary.

The scales are of moderate size, and mostly suborbicular, with the nucleus subcentral, and with numerous radiating striæ. The lateral line runs through about fifty or fifty-five, and from the dorsal to the base of the ventral fins there are seventeen rows, ten of which are above and six below the lateral line.

The color is a dark purple or purplish-blue, with each scale margined with darker. The fins are of the same color as the body.

Specimens of this interesting new species were obtained by Mr. C. S. McCarthy, the collector of Captain Simpson's party, in the Salt Lake Basin of Utah. The species is readily distinguishable by the margination of the scales with a darker color.

GENUS PLATYGOBIO, GILL.

Synonymy.

POGONICHTHYS sp. *Girard*, Researches on Cyprinoid Fishes, (sep. copy, p. 24,) in Proceedings Academy of Natural Sciences of Philadelphia, vol. viii, p. 187, 1856.

The body is elongated, slender, and sub-fusiform, highest before the dorsal fin. The caudal peduncle is oblong and rather stout.

The scales are of large size, and nearly equal on the sides and front of the back; they advance forward nearly to the region above the vertical of the posterior margin of the preoperculum.

The head is small, forming about a fifth of the entire length; it is oblong-conical in profile, and the cranium is wide, the width of the occipital region being only about a third less than the length of the naked dorsal surface.

The snout is moderately depressed and prominent.

The eyes are of moderate size, lateral but superior, and entirely in the anterior half of the head.

The mouth is rather broad, but of moderate size, the maxillary bones ceasing under the anterior borders of the orbits; the lower closes within the upper. The lower lips are separated at the symphysis by a wide isthmus.

Barbels of moderate size are present at the angles of the mouth.

The branchial apertures extend forward to the vertical of the preoperculum, and are separated by a narrow isthmus.

The dorsal fin commences nearly midway between the snout and base of caudal. It is subquadrate, and has about ten rays; the first three are slender and spinous; the anterior spine rudimentary.

The anal fin is similar in size to the dorsal, and is intermediate between the bases of the ventral and caudal fins.

The pectoral fins are subfalciform, the first rays being longest.

The ventral fins are triangular, and situated under the dorsal fin. The axillary scales are elongated, but not pointed.

The caudal fin is forked and its lobes are equal.

The pharyngeal bones are rather stout and expanded at their angles; the peduncle quite short. The teeth are well developed, much compressed, and furnished with narrow grinding-surfaces; they are in a double row, four in the primary and one in the secondary.

The form which we have above characterized is at least as well entitled to a generic separation from the *Pogonichthys* as typified by the *Pogonichthys inæquilobus* of Girard as many of the genera of Cyprinoids distinguished by naturalists. The only species at present known to belong to the genus is that which has been described by Dr. Girard as *Pogonichthys communis*. From the other species of the genus *Pogonichthys*, it is distinguished by its broad and flattened head and muzzle, the very gradual decrease in width of the cranium, and the large scales. It is also worthy of note that all the typical *Pogonichthyes* are inhabitants of California, while the *Pogonichthys communis* is found in the country east of the Rocky Mountains.

The genus *Platygobio* belongs to a group of nearly allied genera, comprising especially *Gobio* of Cuvier, *Semotilus* of Rafinesque, *Pogonichthys* of Girard, and *Algoma* of Girard. Some of these genera have been widely removed from each other, but all of them appear to be very closely allied. It certainly cannot be in conformity with nature to place genera at almost extremes of the family simply on account of the presence or absence of barbels and the presence of one or two rows of pharyngeal teeth. Such are scarcely generic characters alone, and the latter character especially appears to be inconstant, the second row being perhaps deciduous. At least, there are fishes that have been placed in different genera on account of the presence or absence of the inner row of two or three small teeth, which can scarcely be even specifically, much less generically, distinguished. The barbels, being only tags of skin proceeding from the integument of the maxillary bones, have very little systematic value compared with the barbels, and especially the maxillary barbels of the Siluroids. As the above-mentioned differences are those only which have induced ichthyologists to distribute them, we have no hesitation in bringing the above-named genera together as closely-allied members of the same subfamily. *Algoma* was indeed placed by Dr. Girard among the *Chondrostomi*, but he was probably led to that act by the consideration of the single row of pharyngeal teeth and the absence of barbels, and not on account of the presence of a cartilaginous sheath enveloping the lower jaw. Girard has expressly stated that the sheath is not one of the essential characters of the group as understood by him. Bleeker was therefore incorrect in placing that genus in a group of which the presence of the cartilaginous sheath was the principal distinction.

The following appear to be the distinctive characters of the genera above enumerated:

The genus *Gobio* as admitted by Heckel has a compressed and gradually-narrowed head, with the dorsal surface transversely convex, and declining to the snout. *The ventral fins are under the anterior rays of the dorsal fin.* The scales are large, there being about forty in the typical species along the lateral line. The center of the eye is behind the middle of the head. There are well-developed maxillary barbels.

The genus *Semotilus* of Rafinesque has a head much like that of the *Gobiones*, but it is usually larger, and declines less toward the snout. The bases of the ventral fins are more anterior, being almost entirely *in advance of the dorsal fin.* The scales are comparatively small. The eyes are mostly or altogether in the anterior half of the head. The barbels are also somewhat smaller. The genus *Leucosomus* of Heckel and Girard is strictly identical with this.

In the genus *Pogonichthys* as now restricted, the head is small, compressed, and gradually narrowed to the snout; its dorsal surface is transversely convex, and declines quite rapidly to the prominent snout. The periphery of the jaws is elongated-semielliptical. *The ventral fins are under the middle of the dorsal.* The scales are of moderate or rather small size. The eyes are almost entirely situated in the anterior half of the head. The maxillary barbels are small.

The genus *Platygobio* is very nearly allied to *Pogonichthys*, but differs from it by its broader head, the width at the occiput being only about a third less than the naked portion of its dorsal surface; the scales are also larger.

Only one species of *Platygobio* is known. Numerous specimens were collected on Captain Simpson's expedition.

PLATYGOBIO COMMUNIS, GILL.

Synonymy.

POGONICHTHYS COMMUNIS *Girard*, Researches upon Cyprinoid Fishes, (sess. copy, p. 24,) in Proceedings of Academy of Natural Sciences, vol. viii, p. 188, 1856; Girard, Ichthyology of Pacific Railroad Reports, p. 247, pl. lv.

The body is elongated, compressed, and gradually decreases in breadth from the head to the caudal fin. The dorsal outline, anterior to the dorsal fin, is slightly curved to the nostril, and posteriorly nearly straight. The abdominal outline from the ventral fins to the snout is scarcely curved, and behind those fins is almost straight. The greatest height of the body immediately anterior to the dorsal fin equals a fifth of the total length from the snout to the *emarginated border* of the caudal fin, and is twice as great as the width at the same place.

The caudal peduncle is of moderate size, the distance between the posterior angle of the anal fin and the insertion of the caudal equaling fifteen hundredths of the total length, the height behind the anal, thirteen hundredths, and that at the base of the caudal eight hundredths.

The head is conical in profile, flattened and depressed above. The projecting, but flattened, muzzle is vertically rounded. The length of the head from the snout to the margin of the operculum forms a fifth of the total; the upper surface to the scaly nape equals three-fourths of the latter. The width behind equals a ninth of the total length, and at the pupil an eleventh.

The eyes are of moderate size, subcircular, entire, lateral, but near the plane of the superior surface of the head; they are situated entirely in the anterior half of the head, the distance of the pupil from the snout equaling two-fifths of the head's length, and the diameter of the eye itself a fifth of the same. The interorbital space is equal to an eleventh of the total length.

The dorsal fin commences between the fourth and fifth tenths of the total length from the snout, and is higher than long. The base equals a tenth of the total length; the longest ray fourteen hundredths, and the last eight hundredths.

The anal fin commences between the sixth and seventh tenths of the length from the head. Its size is less than that of the dorsal, the base equaling eight hundredths of the total length, the longest ray thirteen hundredths, and the last one seven hundredths.

The caudal fin is forked, and its lobes are equal. The central rays constitute an eighth of the total length, while the longest rays exceed a fifth of the same twenty-one hundredths.

The pectoral fins are emarginated or subfalciform; the longest rays equal a fifth of the length, and are four times longer than the shortest.

The ventral fins are inserted beneath the first rays of the dorsal; the external angles of their bases are distant from each other between six and seven hundredths of the total length. Each fin has a convex margin, and its longest ray equals an eighth of the whole length.

The radial formula is as follows:

$$\text{D. 3. 6. }\frac{1}{1}\text{; A. 3. 6. }\frac{1}{1}\text{; C. 4. I. 7. 8. I. 5; P. 1. 15; V. 2. 7.}$$

The first simple rays of all the fins, except the pectoral, are rudimentary.

The scales are of quite large size, there being about fifty perforated for the lateral line; under the dorsal fin, there are six rows above and seven below the lateral line. Each scale is oblong, or sometimes nearly as high as long, vertical at its base, and rounded behind; there are generally about ten diverging striæ.

The color is reddish-gray or blue on the dorsal region, and on the abdomen is whitish or whitish-yellow. The fins are uniform and colorless.

Numerous specimens of this fish were obtained by Mr. McCarthy, the collector of Captain Simpson's expedition, at Green River, Utah, and in the Platte Valley.

Family SILUROIDÆ, (Cuv.) Bleeker.

Subfamily PIMELODINÆ, (Bon.).

Of this subfamily, there are found representatives of four genera and numerous species in the fresh waters of the United States. These have hitherto, with the exception of the *Noturi*, been referred to one genus, and for that genus the name of *Pimelodus* has been retained.

Now that the *Pimelodi* of Lacépède have been distributed among numerous smaller groups or genera, it remains to ascertain to what group the name *Pimelodus* ought to be restricted, and what names should be applied to the three genera now distinguished among the American *Pimelodinæ*, exclusive of the *Noturi* of Rafinesque.

Lacépède characterized his genus *Pimelodus* simply by the presence of an adipose fin, and included under the name the following species:

PREMIER SOUS-GENRE.

La nageoire de la queue fourchue ou ébranchée en croissant:

1. Le Pimelode bagre, *Pimelodus bagrus* = *Bagrus* sp. Cuv. = *Galeichthys Gronovii* Val. = *Ælurichthys bagrus* B. & G.

2. Le Pimelode chat, *Pimelodus felis* = *Silurus felis* Linn. partim. = *Amiurus* sp.*

3. Le Pimelode scheilan, *Pimelodus clarias* Lac. = *Synodontis clarias* Cuv. = *Synodontis arabi* Val. = *Synodontis schal* Bleeker.

4 Le Pimelode barre, *Pimelodus fasciatus* = *Platystoma fasciatum* Ag. = *Sorubium fasciatum* Gill.

5. Le Pimelode ascite, *Pimelodus ascita* = Embryonic young.

6. Le Pimelode argenté, *Pimelodus argenteus.* = *Bagrus Herzbergie* Val. = *Netuma Herzbergie* Bleeker.

7. Le Pimelode nœud, *Pimelodus nodosus* = *Arius nodosus* Val. = *Auchenipterus furcatus* Val. = *Auchenipterus nodosus* Mull. & Trosch., Bleeker.

8. Le Pimèlode quatre-taches, *Pimelodus quadrimaculatus* = *Hemipimelodus quadrimaculatus* Bleeker.

9. Le Pimèlode barbu, *Pimelodus barbus* = *Bagrus Commersonii* Val. = *Guiritinga Commersonii* Bleeker.

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* The *Pimelode chat* (*Pimelodus felis*) of Lacépède is chiefly founded on the *Silurus felis* of Linnæus, and the enumeration of the rays of the dorsal and anal fins is taken from the Systema Naturæ, but the mention of the color and partly of the habitat appears to be on the authority of Daubenton and Hauy and of Bonnaterre.

The *Silurus felis* of Linnæus, described on the authority of Dr. Garden as having six barbels and twenty-three anal rays, and as being allied to the *Silurus Catus*, can only be an *Amiurus*, whose nasal barbels have been overlooked. The species of the Encyclopedists described as being from Cayenne, where it is called *Machoiran blanc, Paisani,* and *Petit Gueule,* and whose color is white, is unrecognizable.

10. Le Pimèlode tacheté, *Pimelodus maculatus* Lac., Val. = *Rhamdia maculata* Bleeker = *Pimelodus maculatus* Lac.

11. Le Pimèlode bleuâtre, *Pimelodus cærulescens.*

This species is described as having two barbels above and two below, besides the supramaxillary ones. It cannot be referred with certainty to any known genus.

12. Le Pimèlode doigt-de-negre, *Pimelodus nigrodigitatus* = *Arius acutivelis* Val. = *Melanodactylus acutivelis* Bleeker = *Melanodactylus nigrodigitatus.*

13. Le Pimèlode Commersonien, *Pimelodus commersonii* = *Pimelodus barbus* Lac. = *Bagrus commersonii* Val. = *Guiritinga Commersonii* Bleeker.

14. Le Pimèlode Thunberg, *Pimelodus Thunberg* = *Silurus maculatus* Thunberg = *Silurus ocellatus* Bl., Schn. = *Arius ocellatus* Val., Bleeker = *Arius maculatus.*

15. Le Pimèlode maton, *Pimelodus catus* = *Pimelodus catus* Val. partim = *Amiurus catus* Gill partim.

16. Le Pimèlode cous, *Pimelodus cous* = *Arius cous* Heckel = New genus near *Glyptosternum cous.*

17. Le Pimèlode docmac, *Pimelodus docmac* = *Bogrus docmac* Cuv., Val., Bleeker.

18. Le Pimèlode bajad, *Pimelodus bajad* = *Bagrus bajad* Cuv., Val., Bleeker.

19. Le Pimèlode erythroptère, *Pimelodus erythropterus* = *Macrones erythropterus.*

20. Le Pimèlode raie-d'argent, *Pimelodus atherinoides* = *Pseudeutropius atherinoides* Bleeker.

21. Le Pimèlode rayé, *Pimelodus vittatus* = *Bagrus vittatus* Val., Bleeker = *Macrones vittatus.*

22. Le Pimèlode moucheté, *Pimelodus guttatus* = *Pimelodus ? guttatus* Bleeker = *Amiurus ? gutata* sp. incert.

SECONDE SOUS-GENRE.

La nageoire de la queue terminée par une ligne droite ou arrondie et sans échrancrure:

23. Le Pimèlode casque, *Pimelodus galeatus* = *Auchenipterus maculosus* Val. = *Trachycorystes* (?) *galeatus* Bleeker.

24. Le Pimèlode chili, *Pimelodus chilensis* = *Silurus chilensis* Linn.

In the year 1817, Cuvier published the first edition of his "Règne animal", and revised the class of Fishes. He formed a family for the *Siluri* and allied fishes, to which he gave the name of *Siluroides.* In this family, he admitted four great genera, *Silurus* Linn., *Malapterurus* Lac., *Aspredo* Linn., and *Loricaria* Linn. The *Siluri* were divided into five sections, the second of which was called that of the *Machoirans* or *Mystus.* The latter name was erroneously quoted as of Artedi and Linnæus in his first editions (Arted. et Lin. dans ses premières éditions); erroneously, for the name of *Mystus* does not occur as the designation of a genus in the special works of either of those naturalists.* It was first applied to a genus of Siluroids by Gronovius in the first part of his "Museum Ichthyologicum", where two species of the genus *Rhamdia* of Bleeker were referred to it. The name of *Mystus* would have to be then retained for that genus had it not been previously applied by Klein to a genus of Cyprinoids.

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* It is applied to species of the genus *Pimelodus* of Lacépède by Artedi in the great work of Seba (Locupletissimi Rerum naturalium Thesauri Accurata Descriptio et Iconibus artificiosis simus expressio per universam Physices historiam); but the third fasciculus, in which the fishes are described, was not published until long after the death of Artedi; and much has apparently been interpolated in that work of which that great ichthyologist was not the author.

The Cuvierian section of *Machoirans* included all those Siluroids which had two dorsal fins, the first of which was rayed and the second adipose. There were consequently referred to it the *Pimelodi*, *Ageneosi*, and *Dorades* of Lacépède. The *Machoirans* were again divided into groups, for which were retained the above names of Lacépède.

Finally, *Pimelodus* of Lacépède was itself taken with the limits assigned to it by its founder, and divided into three subgenera characterized by their dentition.

The first of these was *Synodontis* of Cuvier, which included the third species of the Lacépèdian genus *Pimelodus*—*Le Pimelode scheilan.*

For the second subgenus, the Lacépèdian name of *Pimelodus* was retained. It was intended to include those which had teeth only on the intermaxillaries and dentaries.

The third subgenus was named *Bagrus*, and included those which, in addition to the teeth on the jaws, had a parallel band on the vomer.

To that genus were referred the first,* fourth,† thirteenth,‡ seventeenth,§ and eighteenth|| species of Lacépède's genus *Pimelodus.* The ninth species of Lacépède** was considered as synonymous with his thirteenth. To illustrate the sequence and relative value assigned by Cuvier to his various groups, we subjoin the following extract from his methodical index:

MACHOIRANS (*Mystus* Artedi).
PIMELODES *Lacép.*
SHALS (*Synodontis* Cuv.).
PIMELODES PROPREMENT DITS (*Pimelodus* Cuv.).
BAGRES.
AGENEIOSES *Lacép.*
DORAS *Lacép.*

The next naturalist who circumscribed the genus was Rafinesque. That writer, in the "Ichthyologia Ohiensis", retained *Pimelodus* as the name of a genus, and the characters assigned by him to it were not essentially different from those of Lacépède; he added that the adipose fin is separated from the caudal. By that feature, he distinguished the genus from his *Noturi*, in which there is an "adipose fin very long, decurrent, and united with the tail".

The species of the Ohio referred to the genus so limited were placed in a subgenus called *Ictalurus*, which exactly corresponds to *Pimelodus* as restricted by Dr. Girard in the Report on the Ichthyology of the Pacific Railroad Surveys. The diagnosis of *Icta-*

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* *Pimelodus bagrus* Lac. = *Ailurichthys bagrus* Gill.

† *Pimelodus fasciatus* Lac. = *Sorubium fasciatum* Gill.

‡ *Pimelodus commersonii* Lac. = *Guiritinga commersonii* Bleeker.

§ *Pimelodus docmac* Lac. = *Bagrus docmac* Cuv.

|| *Pimelodus bayad* Lac. = *Bagrus bayad* Cuv.

** *Pimelodus barbus* Lac.

lurus given by Rafinesque is, perhaps, the best description of a genus given in his work, and is thought worthy of being copied:

"Head depressed, with eight barbs, one at each corner of the mouth, longer than the others, four under the chin, and two on the snout behind the nostrils. Teeth in two patches, acufe and file-shaped. Pectoral fins and first dorsal fin armed with an anterior spine. First dorsal trapezoidal and before the abdominals; second opposite the anal. Body compressed behind, vent posterior and sub-medial. Operculum simple."

By the above limitation, the subgenus *Ictalurus* is seen to partly correspond with that of *Pimelodus* of Cuvier, the teeth being said to be in two patches or only on the jaws. By the description of the condition and position of the fins and the number of barbels, it includes only a small section of the Cuvierian subgenus.

The name *Ictalurus* must be then reserved for some of our Siluroids—for all, if they should be found to be congeneric—for a section, if it is ascertained that several genera are embraced under the subgenus.

Our studies of the Siluroids have convinced us that there are four natural genera found in the United States, three of which were included by Rafinesque in his subgenus *Ictalurus*, but placed at the same time in sections, which received from him various scientific names.

The sections established by Rafinesque were chiefly characterized by the form of the "tail" or caudal fin, and of the eyes, and the number of rays in the abdominal or ventral fins.

The first section was named *Elliops*, and included fishes with the "tail forked. Eyes elliptical. Abdominal fins with less than nine rays."

This group exists in nature, and is of generic value, but the characters given by Rafinesque are not those which essentially characterize it, nor can the name *Elliops* be retained for it.

The name given to a group as a whole must be preserved, and if that group is divided into sections, one of those sections must retain the name of the greater group In Rafinesque's system, *Ictalurus* is the greater group, and in it are included all the North American *Pimelodi*, with the exception of *Noturus*. When Rafinesque divided that group into sections, he should, therefore, have still retained that name for one of them. Such has not been done, but upon each of his sections was conferred another name. As this is in opposition to the rules of nomenclature, *Ictalurus* must be restored to one of his sections, and it is advisable to retain it for his first, and reject the name of *Elliops*. The section with this name is now accepted as a genus; its diagnosis will be hereafter given.

The name *Pimelodus*, it is true, was applied to all the *Ictaluri*, and by that name only are they called. If *Pimelodus* had been of Rafinesque's creation, that name should, therefore, have been adopted; but as Rafinesque has only taken it from Lacépède, with the characters given to it by its founder, it is to be supposed that he intended it to be otherwise restricted. It appears to us that it is no valid argument against the acceptation of Rafinesque's names for genera, if his sections should prove to be such, that he did not apply them specifically.

The section called *Elliops*, on comparison with its type *Pimelodus cœrulescens* of

Rafinesque (not Lacépède), has been found to be identical with *Synechoglanis* of Gill. The most essential characteristics of that genus had been omitted by the former naturalists who had described its species. The present author, not willing to believe that such was the case, although recognizing the similarity of external appearance between the type of *Synechoglanis* and the *Pimelodus cærulescens*, described it under the new generic name. When an opportunity was at length offered to examine species of the group typified by *Pimelodus cærulescens*, its generic identity with *Synechoglanis* was evident. We have, therefore, renounced our own name, under which the genus was first truly characterized, and adopt the prior designation of Rafinesque, but, instead of *Elliops*, take the name *Ictalurus*, as previously mentioned.

This second section of Rafinesque's *Ictaluri* was named *Leptops*, and is characterized by the "tail bilobed. Eyes round and very small. Nine abdominal rays Vent posterior. Adipose fins large."

In this section, two nominal species were included, the *Pimelodus viscosus* of Rafinesque and his *Pimelodus nebulosus.* The latter was "said to be totally different from the foregoing, and might perhaps form a peculiar section or even subgenus (*Opladelus*), by the conical head, membranaceous operculum, but particularly, because the first rays of all the fins, except the caudal and adipose, is a kind of soft obtuse spine concealed under the fleshy cover of the fins."

Rafinesque's assertion that his *Pimelodus nebulosus* was "totally different" from the *Pimelodus viscosus* has neither been substantiated by his own description, nor by the observations and explorations of Dr. Kirtland in the same waters as those in which Rafinesque himself pursued his investigations. The *Pimelodus nebulosus* and *viscosus* were doubtless varieties of the same species. The descriptions are mutually applicable to each other, except in those cases where the characters given are evidently fictitious or erroneous, which, indeed, are very frequent.

Rafinesque's fourth section is founded on a species, which, according to Dr. Kirtland, is the adult of the *Pimelodus viscosus* of Rafinesque. The section is characterized as having the "Tail entire, eyes elliptical. Nine abdominal rays. Dorsal fins submedial. Pectoral fins with one flat spine serrated outwards and nine rays. Lower jaw longer."

The only species of this section was named *Pimelodus limosus.* The section in question was designated by the name *Ilictis.* The name, however, should have been spelled *Ilyichthys*, in accordance with its thymology and the rule observable for the composition of names.

Rafinesque has named "a genus" *Pylodictis*, which appears to have been also founded on the same fish that had already been three times indicated in his work. The fictitious genus and species were established only on the evidence of a drawing by Mr. Audubon, of a fish "found in the lower parts of the Ohio and in the Mississippi". That drawing, according to Rafinesque, represented a rayed fin instead of the usual adipose dorsal. Such a feature would be in opposition to that general plan on which naked Siluroids with two dorsals are constructed,* and it is therefore certain that Audubon had erroneously represented the species, or that the drawing had been wrongfully interpreted by Rafinesque. It is also stated that there is no lateral line. This statement is as certainly false as the other. The remainder of the description applies better to the *Pimelodus* or *Hoplodelus limosus* than to any other Siluroid of the Ohio.

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* The genus *Phractocephalus* of Agassiz forms no exception to this. A mistake similar to that made by Audubon or Rafinesque occurs in the great work on Brazilian Fishes of Spix and Agassiz. A species is figured in the plates under

The generic diagnosis of Rafinesque describes the "Body scaleless, conical flattened forwards and compressed behind. Head very broad and flat with barbs, eyes above the head. Two dorsal fins, both with soft rays. Vent posterior."

The numbers of the rays of the fins are not given; but the description of the form of the body and head, the position of the vent, the color, and we may even add the popular name attributed to it, leave no room for doubt as to at least the generic identity of the *Pylodictis limosus* with the *Hopladelus limosus*

Another section, and the last one to be mentioned, into which Rafinesque divided the *Ictaluri*, was placed as the third, and named *Ameiurus*. His generic characters are the following:

"Tail entire. Eyes round. Eight abdominal rays. Vent posterior. Dorsal fin anterior with a spine. Lower jaw not longer. Pectoral fins with one simple spine and seven rays."

This section corresponds to the restricted genus of which the common *Pimelodus catus* and *Pimelodus Dekayi* are the well-known representatives. Rafinesque refers to the section four species which appear to be truly congeneric. Dr. Kirtland, in his "Descriptions of the Fishes of Lake Erie, the Ohio River, and their tributaries," refers to only one of these—the *Pimelodus cupreus*. If we can rely upon the description of Rafinesque, the *Pimelodus lividus* was not known to Dr. Kirtland. It may, however, be the species described by that naturalist as *Pimelodus catus*. There is little doubt that the same is the case with the *Pimelodus melas*. The *Pimelodus xanthrocephalus*, on the other hand, appears to be only a variety of the *Pimelodus cupreus* of the same author.

In identifying the species of Rafinesque, we must, however, bear in mind that his descriptions are generally so inaccurate or vague that of many of them we can never be certain, and we can only have an approximate idea when the zoology of those places which were so unfortunate as to receive his attention has been exhausted. That unhappy man had, nevertheless, a keen appreciation of natural affinities; and had he been less aberrant, he would have ranked far ahead of most of the naturalists of his day.

As to the application of the name *Pimelodus*, it would appear necessary to reserve it for one of those species referred to it by Lacépède which has not been placed in other genera or groups, and which has been retained in the genus by its last monographer.

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the name of *Heterobranchus sextentaculatus*. It has a long second dorsal, which appears to be furnished with true rays. On this character, Mr. Swainson has founded his genus *Pteronotus*, and, totally deceived as to its affinities, has placed it between the genera *Phractocephalus* of Agassiz and *Sorubium* of Spix in his subfamily of *Sorubinæ;* that group is separated by the subfamilies *Aspredinæ* (composed of true *Aspredinidæ* and of *Eremophili*), and the *Silurinæ* from the subfamily *Pimelodinæ;* both of the latter groups are also composed of genera arranged in a fantastical and unnatural manner. All of the characters of the *Heterobranchus sextentaculatus* indicate its affinity with the *Pimelodinæ*, and it is indeed a true *Pimelodus* of Cuvier and Valenciennes, and, according to the latter, is identical with his *Pimelodus Sebæ*, and consequently belongs to the genus *Rhamdia* of Bleeker, or *Pimelonotus* of Gill. The last two names were published nearly simultaneously, but Bleeker's has probably the priority. Swainson's name could not be accepted, even if correctly applied, as it has been previously given to a valid genus of *Chiroptera*.

The restriction of Cuvier will exclude its application to any except those with teeth only on the jaws.

Rafinesque having conferred a name on those species which had eight barbels, and teeth on the jaws only, the name is excluded from application to any of them.

Subsequent authors have separated other forms referred by Lacépède to the genus. The only species that remained after them, which was not covered by the generic characters of the species separated from *Pimelodus*, was the *Pimelodus maculatus*. For that species the generic name *Pimelodus* must be then retained. That species has been referred by Dr. Bleeker, in his recently-published monograph of the *Silurii*, to a genus to which he has given the name *Rhamdia*, and which had nearly simultaneously, but probably somewhat later, received from myself the name of *Pimelonotus*. As the *Pimelodus maculatus* appears to be generically distinct from the *Pimelodus Sebæ*, the type of the genus *Rhambia*, both names may still be retained.

ICTALURI, GILL.

The body is more or less elongated, compressed posteriorly, and terminated by a well-developed caudal fin. The skin is naked and unprovided with sucking-cups.

The head in profile presents the appearance of a more or less elongated cone, and is covered by a skin which is generally quite thick. It is more or less flattened and broad above, and gradually becomes narrowed to the convex snout. There is never a casque, or helmet. The supra-occipital terminates in a point.

There are eight barbels: the two maxillary constant in the family, a pair in front of the posterior nasal apertures, and two pairs arranged in a curved line behind the lower jaw.

The nostrils form nearly a transverse parallelogram between the intermaxillaries and the eyes; the anterior are suboval or subcircular, and the posterior linear, with a raised margin, from the front of which the upper barbels originate.

The eyes are generally placed in the anterior half of the head.

The branchial apertures are ample, continued from the supero-posterior angles of the opercula to beneath the throat.

ICTALURUS, (RAF.) GILL.

Synonymy.

ICTALURUS *Raf.* Ichthyologia Ohiensis, p. 61.
ELLIOPS *Raf.* Ichthyologia Ohiensis, p. 62.
SYNECHOGLANIS *Gill*, Annals Lyceum of Nat. Hist. of New York, vol. VII, p. 39.
PIMELODUS sp. *Kirtland, auct.*

Body elongated, slender, and much compressed. The caudal peduncle is short but slender, and presents behind the anal an elongated elliptical section.

Head conical in profile, compressed, and with the sides posteriorly sloping downward and outward. The supra-occipital is prolonged backward, and its emarginated apex receives the acuminate anterior point of the second interspinal. The skull is covered by a thin tense skin, through which the sculpture of the bones is apparent.

Eyes large and almost entirely lateral.

Mouth moderate or small, transverse, and terminal. The upper jaw generally protrudes beyond the lower.

Teeth subulate and aggregated in a short laterally-truncated band on each jaw.

Branchiostegal rays eight or nine.

Dorsal fin situated over the interval between the pectoral and ventral fins, higher than long, with one spinous and six articulated rays.

Adipose fin pedunculated and over the posterior portion of the anal.

Anal fin long, and provided with twenty-five to thirty or more rays; it commences near the anus.

Ventral fins provided each with one simple and seven branched rays.

Caudal fin elongated and quite deeply forked, with the lobes equal and pointed.

The genus *Ictalurus* is at once recognized by its forked caudal fin, and its compressed, elongated, and slender body, which gives to it a peculiarly graceful appearance, very unlike that of the stout, obese, and large-headed catfish of our Eastern and Middle States. The head is smaller in proportion than in the *Amiuri*, more compressed, and not covered by so thick a skin; the mouth, as we should naturally expect, is also very considerably smaller. But perhaps the most important distinction resides in the mode of insertion of the supra-occipital or interparietal bone into the head of the second interspinal. A firm and immovable bridge is thus formed, and gives an uninterrupted passage from the dorsal fin to the snout.

ICTALURUS SIMPSONII, GILL.

The body is slender, elongated, and compressed; the height is greatest at the dorsal fin; it is there equal to between a fifth and sixth of the total length from the snout to the concave margin of the caudal; thence it gradually declines for some distance, more rapidly as it approaches the end of the anal fin, the dorsal and especially the abdominal outlines over the anal fin being slightly curved. The caudal peduncle is least high near the middle, where it equals a twelfth of the total length. The greatest thickness is at the bases of the pectoral fins, and is about eight-ninths of the height; thence it quite regularly diminishes to the compressed and thin base of the caudal fin.

The head is compressed, and presents in profile an oblong-conical form; from the projecting snout to the margin of the bony operculum it forms twenty-two hundredths of the total length, exclusive of the lobes of the caudal fin. The height, at the vertical of the margin of the operculum, nearly equals a sixth of the total length, and bears the relation to the length of the head of fifteen to twenty-two. The head above is oblong and nearly regularly decreases in width from the pectorals to the snout; at the vertical of the eyes, it equals three-quarters of the greatest width, and the bony interorbital space only equals three-eighths of the same. The head above is transversely arched posteriorly, and beneath is flat.

The eyes are large and oval, mostly situated in the anterior half of the head on the sides. The largest diameter is between a fifth and sixth of the head's length; the interorbital space is double the diameter.

The maxillary barbels are slender, and extend beyond the opercula. The nasal barbels are very slender, and are scarcely longer than the diameter of the eye. The infra-maxillary barbels are in a curved line nearly parallel with the jaw; the external ones exceed half the length of the maxillary, and are twice as long as the internal infra-maxillary ones.

The branchiostegal rays are enveloped in a thick skin; there are eight, of which the two internal are flattened and largest; the rest are slender, and rapidly decrease in length. The branchiostegal membrane is deeply excavated, and is attached to the throat for about half the interval between the mental fold and the bottom of the emargination of the membrane; the mental fold is itself midway between the emargination and the lower jaw.

The dorsal fin commences at a third of the distance from the snout to the concave margin of the caudal fin; its base equals a fourteenth of the total length, and is scarcly half its height. The spine is slender, and about three-fourths of the length of the longest ray; its posterior margin is nearly edentulous, having but two or three tubercles on the posterior half.

The adipose fin is elongated and falciform, and nearly equals in length (or height) the base of the first dorsal; its base is over the penultimate rays of the anal fin.

The anal fin commences at the fifty-six hundredths of the distance between the snout and the concave margin of the caudal fin; it is situated one twenty-fifth of the same length behind the anus. Its base is more than a fifth of the length of the fish; its greatest height anteriorly (as well as can be judged from the imperfect specimens before us) is somewhat greater than an eighth of the total length, and above two and a half times greater than that of the posterior rays.

The pectoral fins have each a strong compressed spine, smooth on the external margin, and armed with strong teeth directed downward on the internal one. The length is equal to thirteen hundredths of the total length, and that of the first articulated and longest ray to fifteen hundredths. The process of the coracoid bone projects beyond the base of the pectoral spine for a distance equal to the interval between the snout and orbit. The ventrals commence between the fourth and fifth tenths of the length; their length somewhat exceeds a tenth of the total. The second and third rays are longest.

The caudal fin is deeply forked, the longest ray being at least twice as long as the central ones; the latter form a ninth of the total length. The base of the fin is convex. The rudimentary rays advance comparatively little on the superior and inferior faces of the peduncle.

The number of rays is as follows:

D. I. 5. $\genfrac{}{}{0pt}{}{1}{1}$; A. 2. 4; P. I. 9; V. 1. 7.

The color of the shrunk alcoholic specimen is purplish-brown above and silvery-bronze on the sides. The free half of the anal fin is darker.

This species is very nearly allied to several of its congeners of the western streams and rivers, but appears to differ from all of them. From the *Ictalurus cærulescens* (*Pimelodus cærulescens* Raf.) and *Ictalurus affinis* (*Pimelodus affinis* Girard), it is at once distinguishable by the fewer rays of the anal fin, there being about thirty rays in that of the former and thirty-five in that of the latter. The distinction from the *Ictalurus olivaceus* (*Pimelodus olivaceus* Girard) and *Ictalurus vulpes* (*Pimelodus vulpes*

Girard) appears to be less tangible. As we have not, at present, access to the specimens on which the latter species are based, we have to rely on the descriptions and figures of their describer. As these are not very satisfactory, we are prevented from entering into minute comparison. We can only state that our present species appears to differ from the former by the longer head, the shorter nasal barbels, and the absence of true serration on the posterior face of the dorsal spine. With the *Ictalurus vulpes* it appears to also disagree by the presence of a larger head and a less deeply-forked caudal fin. Other differences will doubtless be found on comparison. It may, nevertheless, be possibly a mere variety of the *Ictalurus olivaceus*. This can only be ascertained by an autoptical examination.

Two specimens of this species, not in any essential respect differing from each other, were obtained by Dr. Suckley in the Big Sandy River of Kansas.

AMIURUS, (RAF.) GILL.

Synonymy.

AMEIURUS *Raf.* Ichthyologia Ohiensis, p. 65.
ICTALURUS sp. *Raf.* Ichthyologia Ohiensis.
PIMELODUS sp. *auct.*

Body moderately elongated, robust, anteriorly vertically ovate and scarcely compressed. The caudal peduncle is also robust, but much compressed, and at its end equally convex.

Head large, wide, and laterally expanded; above ovate, and in profile cuneiform. The supra-occipital is extended little posteriorly, and terminates in a more or less acute point, which is entirely separated from the second interspinal buckler. The skin covering the bones is thick.

Eyes small or moderate.

Mouth terminal, large, transverse; upper jaw generally projecting beyond the lower.

Teeth subulate or acicular, aggregated in broad bands on the intermaxillaries and dentaries. The intermaxillary band is convex in front, of equal breadth, and abruptly truncated near the insertion of the maxillaries. The lower dental band is anteriorly semicircular, attenuated to the angles of the mouth.

Branchiostegal membrane on each side with from eight to nine rays.

Dorsal situated over the interval between the pectorals and ventrals, higher than long, with pungent spinous ray posteriorly dentated, and six branched ones.

Adipose fin short, and inserted over the posterior half of the anal.

Anal fin of moderate length, commencing within a short distance of the anus, and generally provided with from twenty to twenty-five rays.

The caudal fin is short, with a margin sometimes convex, and sometimes truncate or scarcely emarginate.

Ventrals, each with one simple and seven branched rays.

This genus includes our common Eastern American catfishes, and is readily recognized by the broad head covered by a thick skin, the free termination of the posterior process of the supra-occipital bone, the compressed body, and the slightly emarginate or even convex caudal fin, which is not connected with the adipose dorsal.

AMIURUS OBESUS, Gill.

The body is comparatively short and robust. The greatest height exceeds a fifth of the total length from snout to margin of caudal. The least height of the caudal peduncle equals a tenth of the length. The greatest thickness at the bases of the pectoral fins exceeds a fifth of the length.

The head is almost semi-conical in profile, and is above oval and depressed, and declines in nearly a straight line from the dorsal fin to the snout. From the snout to the bony margin of the operculum, it forms a quarter of the extreme length. The greatest width exceeds a fifth of the total length; the width between the cheeks, under the eyes, equals eighteen hundredths of the same. The interval between the borders of the eyes exceeds thirteen hundredths.

The eyes are small and covered with adipose matter; the diameter of one is equal to about an eighth of the length of the head; they are separated from the middle of the snout by more than a tenth of the total length.

The maxillary barbels are slender and extend little beyond the bases of the pectorals. The nasal barbels extend beyond the posterior borders of the eyes. The infra-maxillary are arranged on a curved line parallel with the lower jaw. The external are little longer than the internal, the former about equal the interval between the eyes; the distance between the bases of the two internal exceeds by about a fourth that between the internal and external of one side.

The branchiostegal rays are enveloped in a thick skin; there are nine, the two upper of which are large and compressed. The branchiostegal membrane is deeply excavated, and, as in all the *Ictaluri*, when closed, or not expanded, appears anteriorly as a simple fissure or fold; the mental fold is much nearer the bottom of the emargination than the jaw. The membrane itself is attached for nearly half the distance between the fold and the emargination.

The dorsal fin commences scarcely behind the end of the first third of the length; its length nearly equals a twelfth of the length, as does also that of the spine; its height is about a seventh of the length.

The adipose fin is semi-cordiform.

The anal fin commences at the fifty-four hundredths part of the distance between the snout and end of caudal; its length equals a seventh of the total length, and its height less than a thirteenth; it rapidly increases in height in front, and as rapidly decreases behind.

The pectoral fins are short, their length little exceeding a seventh of the total; the spine equals an eleventh of the length, is moderately stout, externally edentulous, and internally toothed.

The process of the coracoid bone is spiniform, and from the base of the pectoral spine equals seven ninths of its length.

The ventral fins commence slightly behind the fourth tenth of the length; they equal a seventh of the length. The third ray is the longest.

The caudal fin, when expanded, appears to be truncated, and forms fifteen hundredths of the total length.

D. I. $4\frac{1}{1}$; A. 4. 13. $\frac{1}{1}$; C. 7. 1. 15. 1. 9; P. I. 8; V. 1. 7.

The color, in spirits, is olivaceous on the head and body above and laterally, and below and on the abdomen whitish. The membrane between the rays of all the fins is blackish, while the rays themselves are light. The bases of the anal and caudal fins are reddish. The teeth are of a dark-purplish color.

Two specimens of this species were obtained on Captain Simpson's expedition by Mr. McCarthy. The precise locality is not known; but it is supposed that they were obtained in Nebraska.

NOTURUS, Raf.

Synonymy.

NOTURUS *Raf.* American Monthly Magazine and Critical Review, vol. iv, p. 41, Nov., 1818.

NOTURUS *Raf.* Prodrome de soizante-dix nouveaux Genres d'Animaux découverts dans l'intérieur des États-Unis en 1818 *in* Journal de Physique, vol. lxxxviii, p. 421, June, 1819.

NOTURUS *Raf.* Ichthyologia Ohiensis, or Natural History of the Fishes inhabiting the River Ohio and its tributary streams, p. 67; ib. in Western Review and Miscellaneous Magazine, vol. —, p. 361, July, 1820.

NOTURUS *Baird*, Iconographic Encyclopædia of Science, Literature, and Art, vol. i, Zoölogy, p. 216.

SCHILBEOIDES *Bleeker*, Ichthyologiæ Archipelagi Indici Prodromus, vol. i, Siluri (Acta Societatis Scientiarum Indo-Nederlandicæ, vol. iv), p. 258.

SILURUS sp. *Mitchill*, American Monthly Magazine and Critical Review, vol. i, p. 289, and vol. ii, p. 322.

Body moderately elongated, anteriorly subcylindrical, and thence more or less compressed.

Head large, elongated, conic or cuneiform in profile, above ovate and depressed, with a slight longitudinal furrow, branching into a transverse depression on the nape. The skin is very thick, and entirely conceals the bones. The supra-occipital has no connection with the head of the second interspinal.

Eyes of small or moderate size.

Mouth anterior, large, and transverse. The upper jaw projects beyond the lower.

Teeth subulate, and closely aggregated in a broad band in each jaw, which, in the lower one, is interrupted by a linear interval, and in the upper one is continuous; the band of the upper jaw is either abruptly truncated at each end, or prolonged backward by a continuation from the postero-external angle. The lower band is, as usual, attenuated toward the corners of the mouth.

Branchiostegal membrane with nine rays on each side.

Dorsal fin situated over the posterior half of the interval between the pectoral and ventral fins, with a very pungent, short, edentulous spine, and seven branched rays.

Adipose fin long and low, connected with the accessory rays of the caudal fin, and not forming a separate fin.

Caudal fin very obliquely truncate or rounded, and inserted on an equally obliquely rounded base; the rays rapidly decrease in length inferiorly, and there are numerous rudimentary ones, both above the caudal peduncle, where the anterior is united to the adipose fin and forms a continuous keel, and below, where they advance considerably forwards.

The anal fin is comparatively short, and rapidly increases in height for the first half of its length.

The ventrals are rounded, and each has one simple and eight branched rays.

The anus is situated some distance in advance of the anal fin.

The *Noturi* are at once recognized by the peculiarly-formed caudal fin and its oblique insertion on the peduncle, and by the ovate head, with the transversely-depressed nape and median longitudinal groove.

For our earliest information of a species of this genus, we are indebted to Dr. Samuel L. Mitchill; but the description of that naturalist is incorrect, or, at least, his interpretation of the characters observed is erroneous. Subsequent naturalists have, therefore, been much deceived as to its affinities.

The principal error in Mitchill's description is the assertion of the absence of an adipose fin. But this statement is readily reconciled with the features of *Noturus* when it is remembered how low that fin is, and how it unites with the caudal. Mitchill drew attention to the peculiarity of the caudal, and described it as commencing an inch behind the dorsal fin, and thence "continued quite round the tail, and almost to the anal fin. The form is lanceolated and pointed," and "it may be compared to the tail of an eel; the resemblance is nearer to that of a tadpole, when it approaches the period of conversion to a frog." The peculiarities thus noticed and the rest of Mitchill's description leave no doubt as to the true affinities of the *Silurus gyrinus*, and as to the correctness of Rafinesque in afterward referring it to his genus *Noturus*.

Mitchill observed that "the want of serræ to the spines, and of a second dorsal might lead some to remove this fish from the *Siluri* family; but to avoid needless innovation, I retain him here." Mitchill, when inditing that remark, must have forgotten that the type of *Silurus* was without an adipose fin, and that the presence of such a fin was consequently an exceptional rather than a normal character of the Linnæan genus, although the greater portion of its species were provided with it. The want of serræ to the spines is not of as much value as Mitchill supposed.

Dr. De Kay, in his Fauna of New York, introduced Mitchill's description of *Silurus gyrinus* at the end of the *suite* of the *Pimelodi* of the State described in his work, and remarked that "on account of its dorsal spine it cannot be admitted into that genus" (*Silurus* Val.); and the same spine being smooth, and not serrated, excludes it from *Schilbe*. Its natural position in a general arrangement of the *Siluridæ* would seem to be between *Schilbe* and *Cetopsis*, forming a passage, by its simply spinous anterior dorsal and pectoral ray, from one to the other. It may be thus characterized: "No adipose fin; simple spines to the dorsal and pectoral; anal long; caudal pointed, not united to the anal." Important details respecting the teeth are wanting to complete the character.

Having already noticed the true relationship of *Silurus gyrinus*, it necessarily follows that there is no near affinity between it and the genera noticed by De Kay.

The description of Mitchill and the remarks of Dr. De Kay have also led Dr. Bleeker into error. That learned ichthyologist, in his Monograph of the *Siluri*, has formed a distinct genus for the *Silurus gyrinus*, which he has named *Schilbeodes*, and which is interposed between *Hematogenys* of Girard and *Trichomycterus* of Cuvier and Valenciennes, in the subfamily of *Silurichthyoidei* and the group of *Trichomycterini*. Bleeker's generic characters are the following:

"*Schilbeodes* Bleeker.* Pinna dorsalis caudali quam capiti approximata; analis caudali contigua. Cirri 8."

The diagnosis relating to the dorsal fin is erroneous. Mitchill not having mentioned the position of that fin, Bleeker must have assumed that the caudal was not much more than normally extended on the dorsal region of the peduncle, and, noticing the statement concerning the commencement of the fin an inch behind the dorsal, was thus misled. The remarks we have made on De Kay's allocation of the species apply equally to Bleeker's.

The publication of Rafinesque's diagnosis of the genus *Noturus* soon succeeded Mitchill's description of his *Silurus gyrinus*. Rafinesque's first notice of his genus is to be found in volume fourth of the "American Monthly Magazine and Critical Review". It is there said to "differ from *Silurus* by having the second dorsal connected with the tail, or forming a single fin". The description of the single species (*Noturus flavus*) refers only to the color, the caudal fin, lateral line, superior length of upper jaw, the barbels, and the number of rays, most of which are generic characters. Rafinesque's next description occurs in his "Prodrome de soixante dix nouveaux genres d'animaux, &c.", and is substantially the same as that in the Magazine. As the work in which the "Prodrome" is published is inaccessible to most American students, we add the description in a note.* The name of the species is changed by Rafinesque to *Noturus luteus*. The genus is for the third time described by Rafinesque in the "Ichthyologia Ohiensis". It is there said to "differ from the genus *Plotosus* of Lacépède by having the anal fin free", although there is really no connection between the two genera. The remainder of the description differs little from those previously noticed. The specific name of *Noturus flavus* is restored to the species.

NOTURUS OCCIDENTALIS, GILL.

The greatest height is equal to nearly a sixth of the total length, and less than the greatest breadth outside of the bases of the pectorals. The height of the caudal peduncle behind the anal fin slightly exceeds a tenth of the length.

The head is subcuneiform in profile, and above presents an oval form; at the cheeks behind the eyes it appears to be swollen. The length of the head enters less than four times (0.23) in the total length. The breadth at the opercula nearly equals a fifth of the entire length; that between the cheeks behind the eyes is about the same.

The distance between the eyes equals a tenth of the length, and is of nearly the same extent as that between each eye and the middle of the snout. The eyes themselves are small, a diameter not much exceeding a seventh of the head's length.

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* Bleeker's work not being readily accessible to American students, we extract his remarks in Dutch, which, we must again remind the reader, are founded on error.

"Silurus gyrinus, door Mitchill en 1818 reeds kortelijk doch onvoldoende beschreven, komt mij voor tot de Trichomycterini te behooven. De rugvin schijnt er sell rodert bij de stoortvin te zijn don bij den kop en de aarsvin zon en zeer nabij de stoart vin eindigen. Overigens 8 voeldroden, 7 rugvin en 16 aarsvinstralen. Misscheen een midden vorm tusschen Trichomycterus en Nematogenys."

* 18. NOTURUS. (Abdominal) diffèrent des genres *Silurus* et *Pimelodus* par nageoire caudale décurrente sur le dos jusque vis-à-vis l'anus, et tenant lieu de deux nageoires dorsales adipeuses. *N. luteus*, corps conique comprimée, tête déprimée, 8 barbillons, mâchoire supérieure plus longue, nageoires dorsale et pectorales, queue tronquée, ligne latérale presque droite, couleur entièrement jaunâtre. D. 7; A. 14; P. 7; Abd. 8. C'est une petite espèce: les barbillons sont disposés comme dans les Pimelodes de l'Ohio. Le *Silurus gyrinus* de Mitchill est une autre espèce de ce genre.

The maxillary barbels are slender and scarcely attain to the bases of the pectorals. The nasal barbels extend slightly behind the eyes. The inframaxillary are arranged on a curved line parallel with the jaw; the internal are much more distant from each other than those of one side; the external are about a tenth of the total length; the internal about six or seven tenths as long as the external.

The band of teeth on the intermaxillaries is extended backward from the angles into a point.

There are nine branchiostegal rays concealed in a very thick membrane. The bottom of the sinus of the membrane is very near the mental, the fold being nearly at the end of the third fourth of the distance between the lower jaw and the sinus.

The dorsal fin commences at the beginning of the third tenth of the distance from the snout to the end of the caudal fin. Its length equals a tenth of the length, and is little less long than high. The spine is small and simple, and its length scarcely equal half that of the fin.

The adipose fin is low and thin, begins nearly over the sixth or seventh ray of the anal, and appears, in the single specimen before us at least, to have separated from the accessory rays by a naked interval.

The anal fin commences at the end of the eleventh twentieth of the distance between the snout and end of caudal fin. Its length is not quite equal to a sixth of the total length; it rapidly increases in height toward the middle, where it somewhat exceeds an eleventh of the extreme length. The last rays rapidly decrease in size.

The pectoral fins equal in length an eighth of the total; each has a spine, which enters about eleven times in the length, and which is smooth internally, but on its external border has long serræ. The margin of the fin is rounded.

The coracoid spine is short, stout, and oblique.

The ventral fins commence behind the end of the fourth tenth of the length; each has a length equal to a tenth of the extreme.

The caudal fin is oblong, gradually and obliquely narrowed to the end, which appears to have been nearly truncated.

The supernumerary rays are numerous and well developed, the distance from the anterior to the end of the peduncle being almost as great as the length of the longest rays.

The number and arrangement of the rays is expressed by the following formula:

D. I. 6. $\frac{1}{1}$; A. 4. 11. $\frac{1}{1}$; C. 23. 7. 12. 11; P. I. 10; V. 1. 8.

The color of the single ill-preserved specimen is an olivaceous-brown, light beneath, and with the fins not margined by a darker color.

This species of *Noturus* was collected by Dr. Suckley in the Platte River. It is interesting as being a species of a genus which does not appear to be rich in representatives, and as coming from a more western locality than any other.

HOPLADELUS, (RAF.) GILL.

Synonymy.

GLANIS *Raf.* MSS. American Monthly Magazine and Critical Review, vol. iv.
LEPTOPS *Raf.* Ichthyologia Ohiensis, p. 64.
OPLADELUS *Raf.* Ichthyologia Ohiensis, p. 64.
ILICTIS *Raf.* Ichthyologia Ohiensis, p. 66.
PYLODICTIS *Raf.* Ichthyologia Ohiensis, p. 67.
ICTALURUS sp. *Raf.*
PIMELODUS sp. *Kirtland*, auct.

The body is much elongated, and presents in profile a very slender appearance. It is much depressed, and is anteriorly broader than high.

The head is large, very wide and depressed, laterally expanded, above broadly ovate, and in profile cuneiform. The skin is very thick and entirely conceals the skull. The supra-occipital bone is entirely free from the head of the second interspinal.

The eyes are small.

The mouth is large, anterior, and transverse. The lower jaw projects beyond the upper.

The teeth are in broad villiform bands on the intermaxillaries and dentaries. The intermaxillary band is convex anteriorly, and proceeds to the insertion of the maxillaries, where it is abruptly angularly deflected, and proceeds backward as elongated triangular extension. The band at the symphysis is slightly divided, and anteriorly separated by a small triangular extension of the labial membrane. The lower dental band is anteriorly semi-circular, and attenuated to the corners of the mouth.

There are about twelve branchiostegal rays on each side.

The dorsal fin is situated over the posterior half of the interval between the pectorals and ventrals, and has a spine and about seven branched rays.

The adipose fin is well developed, and has an elongated base resting over the posterior half of the anal; it is very obese, and inclines rapidly backward.

The anal fin commences far behind the anus, is little longer than high, and composed of about fifteen rays.

The caudal fin is oblong, subtruncated, placed on a vertical basis, and with numerous accessory, simple rays, recurrent above and beneath the caudal peduncle.

The pectorals have a broad, compressed spine, serrated or dentated on its external and internal margins, and with the prolonged fleshy integument obliquely striated.

The ventrals are rounded, and have nine rays, one simple and eight branched.

The anus is situated behind the ventrals, some distance behind their bases, and much in advance of the anal fin.

The genus *Hopladelus* is at first sight distinguished by its elongated and anteriorly-depressed body; the depressed and broad oblong head; the bands of very small villiform teeth, and the posterior extension of the upper bands; the small size of the anal, its distance behind the anus, and the recurrence of the caudal fin.

But one species is certainly known.

HOPLADELUS OLIVARIS, Gill.

Synonymy.

Silurus olivaris *Raf.* American Monthly Magazine and Critical Review, vol. iii, p. 355, Sept., 1818.
Glanis limosus *Raf.* loc. cit. vol. iii, p. 447 (Oct. 1818), and vol. iv, p. 107 (without description).
Silurus nebulosus *Raf.* Journal of the Royal Institution, vol. ix, p. 50, April, 1820.
Silurus viscosus *Raf.* loc. cit. p. 50.
Silurus limosus *Raf.* loc. cit. p. 51.
Pimelodus viscosus *Raf.* Ichthyologia Ohiensis, p. 64, July, 1820.
Pimelodus nebulosus *Raf.* Ichthyologia Ohiensis, p. 64.
Pimelodus limosus *Raf.* Ichthyologia Ohiensis, p. 66.
Pylodictis limosus *Raf.* Ichthyologia Ohiensis, p. 67.
Pimelodus punctulatus *Val.* Hist. Nat. des Poissons, vol. xv, p. 134, 1840.
Pimelodus æneus *Val.* Hist. Nat. des Poissons, vol. xv, p. 135 (abstract).
Pimelodus punctulatus *De Kay,* Zoölogy of New York Fishes, p. 187 (abstract), 1842.
Pimelodus æneus *De Kay,* Zoölogy of New York Fishes, p. 187 (abstract).
Pimelodus punctulatus *Storer,* Synopsis of Fishes of North America, p. 151; ib. in Memoirs of American Academy, vol. ii (abstract), 1846.
Pimelodus æneus *Storer,* loc. cit. (abstract).
Pimelodus limosus *Storer,* Synopsis of Fishes of North America, p. 152; ib. in Memoirs of American Academy, vol. ii (abstract).
Pimelodus limosus *Kirtland,* Boston Journal of Nat. Hist. vol. vi, p. 335, 1846.

The body is greatly elongated, and from a lateral view appears to be very slender, slowly diminishing in height toward the caudal; above, it is very much depressed anteriorly, and is rapidly attenuated toward the caudal. The greatest height in front of the dorsal fin is about a seventh of the entire length, while that of the caudal peduncle behind the anal and adipose fins equals a half of the greatest, or a fourteenth of the length. The width at the base of the pectorals is about a third greater than the heigth, and equals a fifth of the length; thence it rapidly diminishes to the caudal peduncle, which, at the base of the fin, is very thin and compressed.

The head, from the projecting lower jaw to the membranous opercular margin, forms little more than a fourth of the entire length. In profile, is elongated conical, or cuneiform, the extreme height at the pectorals being a half of the head's length. Above, the head is oblong, and very flat and depressed. The greatest width equals a fifth of the entire length of the fish, and the eyes a sixth of the same. The sides of the head are slightly convex; otherwise the width nearly equally diminishes to the snout, which is wide and truncated.

The eyes are oval and small, the longest diameter not exceeding a tenth of the length of the head. Their distance from a transverse line parallel with the front of the snout equals three diameters. The interval between each other equals half of the greatest width of the head. Seen from above, they appear to be distant about a diameter from the side of the head.

The maxillary barbels are small and slender, compressed at their base, and with the internal edge rounded. They vary in length, but do not generally much exceed half the length of the head. In one, the barbel on the left side extends to the base of the pectoral. The nasal barbels extend to about the posterior margin of the eye. The inframaxillary ones form the four angles of a transversely-elongated hexagon; the distance between the internal ones is nearly a sixth of the head's length, and that between the external ones exceeds a third of the same ($\frac{8}{26}$). The latter are about half as long as the maxillary, and about twice as long as the internal ones.

The branchiostegal bones appear to amount to twelve on each side; the two internal are wide and compressed and much larger than the others. The branchiostegal membrane is deeply, and when not extended appears to be acutely, emarginated, the emargination extending to the vertical of the posterior border of the eye. The membrane is attached to the throat to within a short distance of the bottom of the emargination. The mental fold is considerably nearer the latter than the jaw.

The dorsal fin commences at three-tenths of the length from the snout over the posterior half of the interval between the bases of the pectorals and ventrals. Its base is equal to about a twelfth of the fish's length, and equals four sevenths of the greatest height. The spinous ray is moderate, and not more than half as long as the second articulated or longest ray; it is entirely enveloped in the skin, and no serratures can be perceived; the skin in which the spine is imbedded is considerably prolonged, compressed, and obliquely rayed or striated.

The adipose fin is elongated, subrhomboidal, advancing slowly outward and backward, very thick at the base, and compressed toward the margin, which is sometimes jagged; it is situated over the last two-thirds of the anal fin, and coterminal with it.

The anal fin commences at nearly six tenths of the distance between the snout and caudal margin; its length is almost equal to a tenth of the same, and its greatest height to a ninth. The rays rapidly increase in length to the middle ones, which are longest. The rays, especially anteriorly and at the base, are enveloped in a thick fat skin.

The pectorals are situated immediately behind the descending opercular margin at less than a quarter of the length. When open, they are horizontal. The four, or longest rays, inclusive of the membranous termination of the spinous one, are nearly equal to a seventh of the entire length. The compressed spine is about half as long as the succeeding rays, and is anteriorly provided with ridges rather than teeth, and posteriorly with tubercular teeth. The membrane continued from it is coterminal with the three succeeding rays, and is striated obliquely forward and interiorly.

The ventral fins commence at the fourth tenth of the length; their bases, if continued backward, would intersect each other at right angles, but the distance by which they are separated behind is nearly equal to their base. Their margins are rounded, and the longest rays are about an eleventh of the length. They cease some distance before the anal fin.

The anus is situated between the ventrals, at a distance in advance of the anal fin equal to a twelfth of the total length; its margin is radiated by ridges. The genital papilla is small and behind.

The caudal fin is scarcely emarginate, and has a straight base; the shortest rays form fifteen hundredths of the total length, and the longest equal sixteen hundredths. Numerous simple rays, enveloped in a very fat skin, are continued on the superior and inferior faces of the peduncle.

The radial formula may be expressed as follows:

D. I. 5. $\frac{1}{1}$; A. 2. 12. $\frac{1}{1}$; C. 20. 1. 7. 8. 1. 10; P. 1. 9; V. 1. 8.

The lateral line is decurrent downward from the angle of the branchial apertures and thence continued along the middle in a straight line to the base of the caudal fin.

The skin is thick, and completely covers the skull, where it has a spongy or wrinkled appearance.

The color is brownish-fawn on the head, blotched with lighter and darker on the trunk, and on the caudal peduncle inclining to reddish. The lower barbels are whitish, like the abdomen and inferior surface of the head.

The *Hopladelus olivaris*, as will be seen by reference to the synonymy, has had the fortune of being described under a large number of names. As several bestowed by the same authors have been brought together as synonymous, the reasons for so doing will be naturally demanded.

For most of the synonyms, we are indebted to Rafinesque, a man that never touched a subject without involving it in confusion. It will therefore excite little surprise to hear that he has described the same species under six different names, and referred it to four different groups, to which he has given five generic names.

The *Silurus olivaris* described by Rafinesque in the third volume of the American Monthly Magazine and Critical Review, p. 355, has been pronounced by Rafinesque himself to be the same as his *Pimelodus nebulosus*, and is consequently the *Pimelodus limosus* of Kirtland.

It is described as follows:

"Body olivaceous, shaded with brown, 8 whole barbs, 4 beneath, 2 lateral thick brown, dorsal fin with 7 soft rays, pectoral fin 10 soft rays, anal fin 12 rays, tail rounded notched, teeth acute."

The above diagnosis, with the exception of those parts relating to the color, number of rays in the anal fin, and form of caudal fin, is applicable to most of the *Ictaluri*. The color is not inapplicable to the *Hopladelus;* the number of anal rays agrees as well with that species as with *Noturus*, and the allusion to the caudal, while it excludes *Noturus*, is referable to *Hopladelus*. The teeth of *Hopladelus* are not, however, well described by the term acute. But as the diagnosis does not suit any other species better, it is doubtless applicable to that one. The difference in the enumeration of the anal rays is probably due to the difficulty of counting them in the thick skin in which they are enveloped.

At page 447 of the same volume of the Magazine, and at page 107 of the fourth volume, the name of *Glanis limosus*, or Mud Catfish, occurs; but there is no description. The species intended is undoubtedly that afterward described as *Pylodictis limosus*, to the subsequent remarks on which we refer.

Rafinesque has best described it under the name of *Pimelodus limosus*. The description is quite creditable to him, as only one serious error occurs. It is stated that there is no lateral line; but there is certainly one present, as in all our North American species. In other respects, the description is sufficiently characteristic, and the number of rays in the anal fin is correctly said to be fifteen. No mention is, however, made of the much depressed head and body, the latter being simply described as "slender". The species is said to differ "from all others by the long lower jaw, &c.", and to attain a length of "about one foot".

The *Pimelodus viscosus* of Rafinesque, the type of his section *Leptops*, appears to be the young of *Hopladelus olivaris*. It is said to have a length of "only four inches", and its color is "brown with bluish and grayish shades covered with a clammy viscosity". The head is described as being "very flat, with a longitudinal furrow above, elongated"; the "anal has fifteen rays and the ventrals nine". Except as to the cephalic furrow, the description so far is not inconsistent with the *Hopladelus olivaris*, but the jaws are said to be "nearly equal" and "the upper hardly longer". This as well as the furrow on the head and the number of rays in the anal fin might tempt us to believe that it was the *Noturus*, but the caudal fin is said to be "unequally bilobed, the upper smaller and white, and the ventrals have nine rays". It is therefore doubtfully treated as identical with the *Hopladelus* until the researches of a naturalist shall show otherwise. It is not mentioned by Dr. Kirtland.

With some doubt, we yield to the opinion of Dr. Kirtland that the *Pimelodus nebulosus* of Rafinesque is the old of *P. limosus*. The species is said to attain a length of from two to four feet. The description is certainly not very characteristic; the species is said to differ from the former by "the conical head, membranaceous operculum, but particularly because the first ray of all the fins, except the caudal and adipose, is a kind of soft obtuse spine, concealed under the fleshy cover of the fins". On account of these differences, it is suggested that the species may belong to a "peculiar section or even sub-genus", for which the name of *Opladelus* is proposed.

No description of the operculum or spines of *Pimelodus viscosus* is given; it is probable that the notes on the two "species" were taken at different times, and that Rafinesque's attention being arrested by the characters mentioned, and not believing that they could have been overlooked by him in the *Pimelodus viscosus*, assumed that a difference existed. It is strange that the jaws should be described as equal, the head simply as "conical depressed", and the body as "conical tapering behind",* and, were not such statements made by an author proverbial for inaccuracy, we might well be excused for believing in the identity of *Pimelodus nebulosus* with a species like the present. The assertion that there are only twelve anal rays may be explained by the subsequent statement that all "the fins are very fat, thick, &c." The eyes of *Pimelodus nebulosus*, as of *P. viscosus*, are said to be round and small; those of our *Hopladelus* are elliptical.

By Dr. Kirtland, the *Pimelodus nebulosus* is considered as "merely the old" of *Pimelodus limosus*. He further remarks that "it is much larger, and proportionally shorter and broader, than the one figured (*P. limosus*). I have never seen the young unless our present species be considered as such."

The *Silurus olivaris* previously mentioned is referred by Rafinesque to his *Pimelodus nebulosus*.

Placing much confidence in Dr. Kirtland's judgment, we have followed him in regarding *Pimelodus limosus* and *P. nebulosus* as identical, but the remark regarding the difference of form excites some suspicion as to his correctness. The degree of difference is not mentioned; Dr. Kirtland would, of course, have noticed the characters mentioned by Rafinesque, if they were more than imaginary.

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* Rafinesque probably intended to be understood as referring to the "conical" outline of the head as seen from the side, and the depressed dorsal surface. The mention of the body as "conical tapering behind" also doubtless refers to the lateral view.

As no other species of *Ictaluroid*, except the *Hopladelus olivaris* and *Noturus*, with fifteen anal rays or thereabouts, has been discovered in the Ohio River by the researches of Dr. Kirtland, we must, for the present at least, regard Rafinesque's descriptions of *Pimelodus viscosus* as well as of *Pimelodus nebulosus* having been based on one of them; they agree best with the *Hopladelus*.

The *Pylodictis limosus*, named by Rafinesque from a drawing of Audubon, appears to be also founded on this species. It agrees tolerably well with the *Hopladelus*, except in the absence of the lateral line, the position of the dorsal over the abdominal fins, and the rayed second dorsal. Audubon probably omitted the lateral line, or did not represent it very distinctly; there is certainly no American Siluroid without it. The last rays of the dorsal being nearly over the bases of the ventrals, the statement, considering the author of it, sufficiently approximates to the fact. The edge of the adipose of *Hopladelus* is frequently jagged or torn, and, being so represented by Audubon, appeared to Rafinesque to be rayed. It is stated that the species "sometimes reaches the weight of twenty pounds" and "bears the names of Mud Cat, Mud Fish, Mud Sucker, and Toad Fish", names which increase the evidence in favor of the identity of Rafinesque's *Pimelodus limosus* and *Pylodictis limosus*.

The descriptions given by Rafinesque in his Monograph of the Siluri of the Ohio are all referred to the above species by their author.

In the twelfth volume of the "Histoire Naturelle des Poissons", Valenciennes describes a species as *Pimelodus punctulatus*, which appears to be also identical with the *Hopladelus*. Specimens had been sent from New Harmony and from New Orleans by Lesueur. It is said to have the form of the *Pimelodus catus*, but with a shorter anal; the lower jaw is the longer; the head very much depressed, and forming a quarter of the entire length, and a fifth longer than wide; the maxillary barbels reach the middle of the operculum; the ossified part of the pectoral spine is half the length of the fin, has its borders serrated in opposite directions, and is prolonged in a soft and articulated point. There are twelve branchiostegal rays and sixteen anal. The color is brown, dotted with black and with irregular black blotches.

The description of Valenciennes answers in every respect to the *Hopladelus*, except as to the number of ventral rays, which is said to be eight. As in every other feature it is applicable to our species, there may have been some mistake in the enumeration, or perhaps even an abnormal variety. It appears to be at least proper to consider the *Pimelodus punctulatus* for the present as identical with the *Hopladelus*.

The description of *Pimelodus æneus* of Lesueur is next abstracted, and Valenciennes remarks that, except as to form and the number of rays, it agrees with his *Pimelodus punctulatus;* he himself remarks that the difference in the number of rays might be explained by the difficulty which the thick membrane in which the rays are enveloped would present to an exact computation. As to form, he objects that the phrase applied to the *Pimelodus æneus*,—"a le corps très-long",—is not applicable to the *Pimelodus punctulatus*, of which the head enters only four times in the length. To this we would answer that the head of *Hopladelus* is certainly only a fourth of the length, but that from the little height of the body the idea derived from a side-view is that the body is very slender, and the character of "corps très-long" is, therefore, quite appropriate. Valenciennes probably did not take this fact into consideration when he observed, in his description of *Pimelodus punctulatus*, that the form was like that of the *Pimelodus catus*.

We have thus united many nominal species. In considering the species of Rafinesque as identical, we have very little hesitation. We have much with regard to those of Lesueur and Valenciennes, and it might, perhaps, have been better to provisionally retain them as distinct. The other course has, however, been preferred, as no other species at all answering to their descriptions can be found.

PLATE I.

ROCCUS CHRYSOPS Gill.

Fig. 1. General form, in which the separation of the dorsal fins, the regular curvature of the anterior dorsal region, and the nearly straight lateral line are to be noticed.

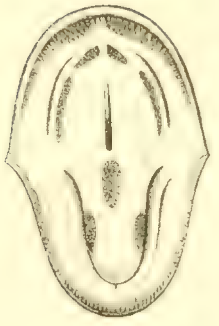
Fig. 2. A scale from the cheek, showing its sub-cycloid character.

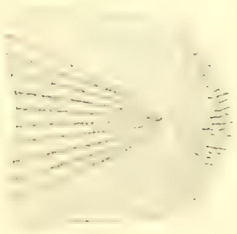
Figs. 3 and 4. Scales from the middle of the trunk above and below the lateral line, illustrating the ctenoid nature of the scales of the body.

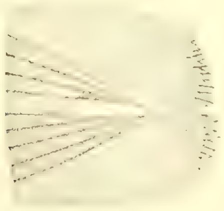
Fig. 5. A scale from the lateral line.

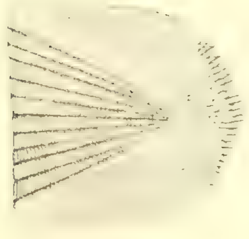
Fig. 6. The mouth open, seen in profile.

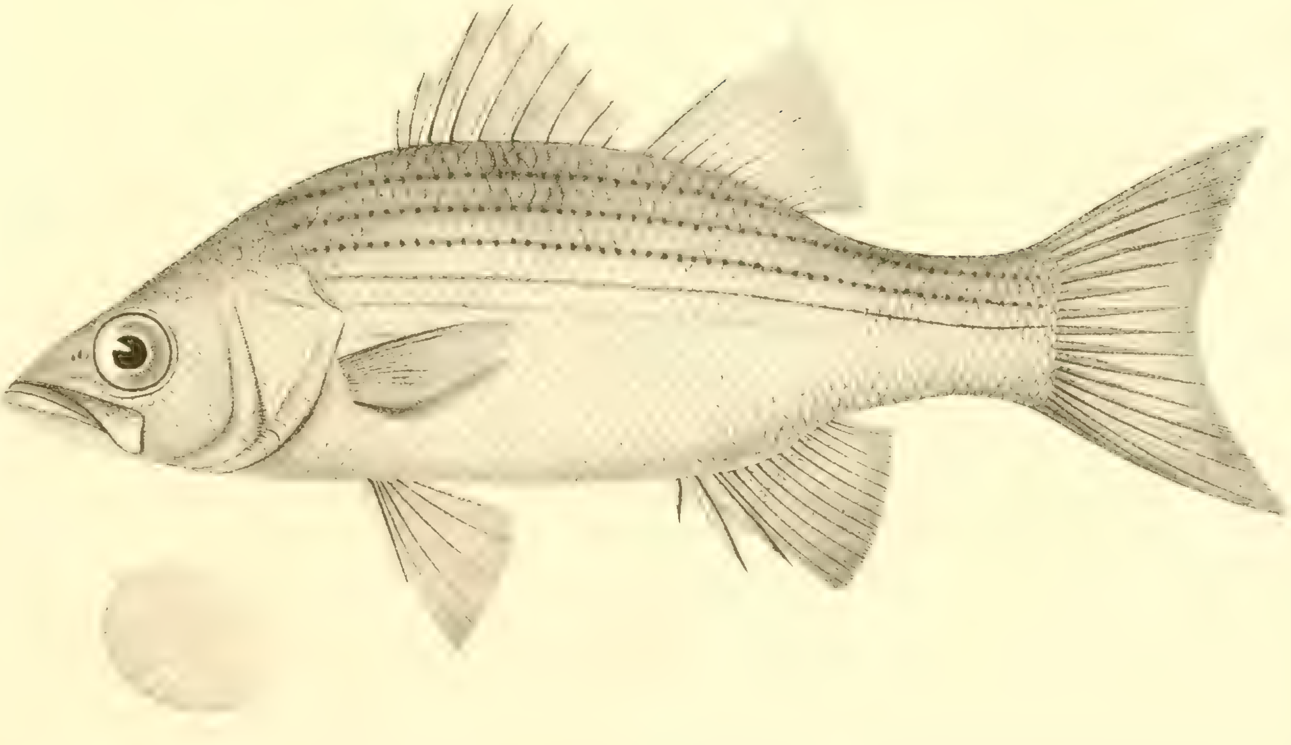
Fig. 7. The open mouth seen from the front, to illustrate the dentition of the base of the tongue and its sides.











J. H. Richard.

T. Sinclair & Son, Lith. Phila.

PLATE II.

MORONE INTERRUPTA Gill.

Fig. 1. Side view of fish. Attention is drawn to the union of the bases of the dorsal fins and the anterior curve of the lateral line.

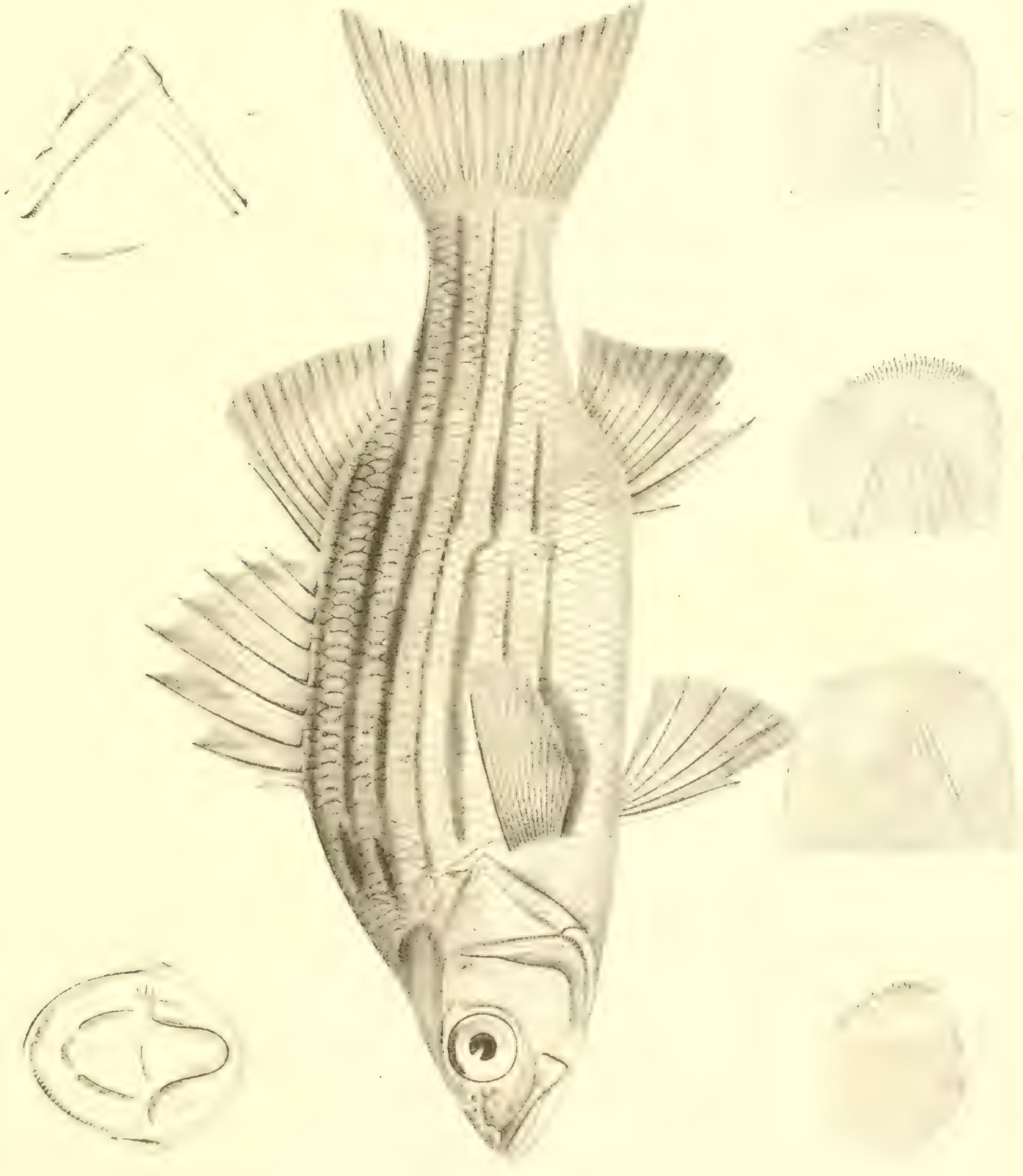
Fig. 2. A scale from the cheeks, exhibiting its ctenoid structure.

Figs. 3 and 4. Scales from the middle of the trunk above and below the lateral line.

Fig. 5. A scale from the lateral line.

Fig. 6. The open mouth seen from the side.

Fig. 8. The open mouth seen from the front, illustrating the villiform band of teeth on the lateral and anterior margins of the tongue.



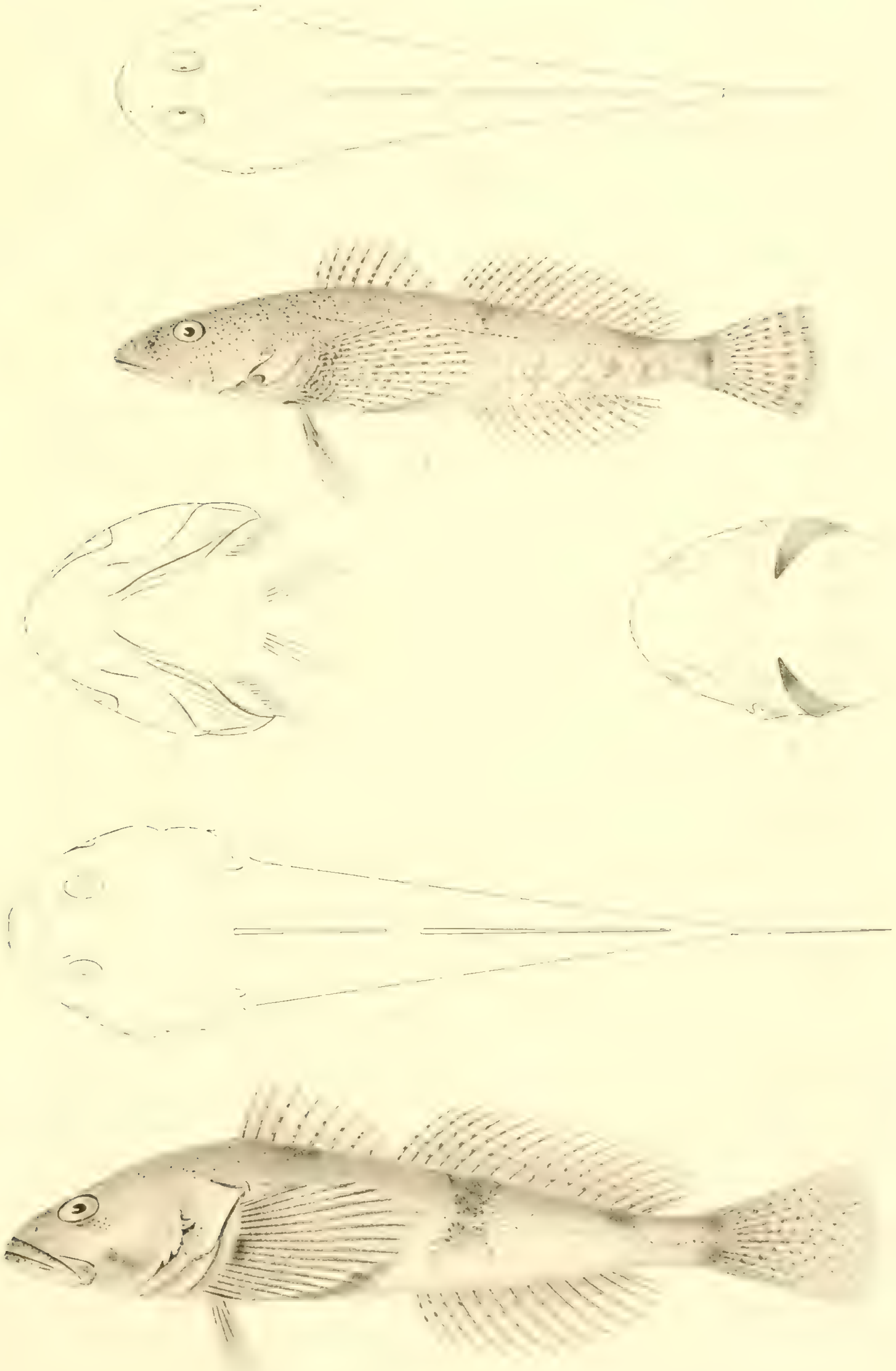
J.H. Richard [illegible]

PLATE III.

POTAMOCOTTUS CAROLINÆ GILL AND POTAMOCOTTUS PUNCTULATUS GILL.

The species of the subgenus *Potamocottus* differ from those of *Uranidea* only in the presence of palatine teeth. The generic characters in common with *Uranidea* are the general form of the body and fins, the depressed oval head, the presence of spines only on the preopercular, subopercular, and nasal bones, and the branchial apertures entirely separated by a moderate isthmus.

FIG. 1. *Potamocottus Carolinæ* Gill.
FIG. 2. The same seen from above.
FIG. 3. The head of same from below.
FIG. 4. *Potamocottus punctulatus* Gill.
FIG. 5. Dorsal view of same.
FIG. 6. The inferior surface of the head.



J. H. Richard [illegible]

1-3. POTAMOCOTTUS CAROLINÆ GILL. 4-6. POTAMOCOTTUS PUNCTULATUS GILL.

PLATE IV.

TIGOMA SQUAMATA GILL.

FIG. 1. Side view of fish. The form of the head and body, size of the scales, and form and position of the fins are to be observed.

FIG. 2. The superior surface of the head.

FIG. 3. The inferior surface of the head.

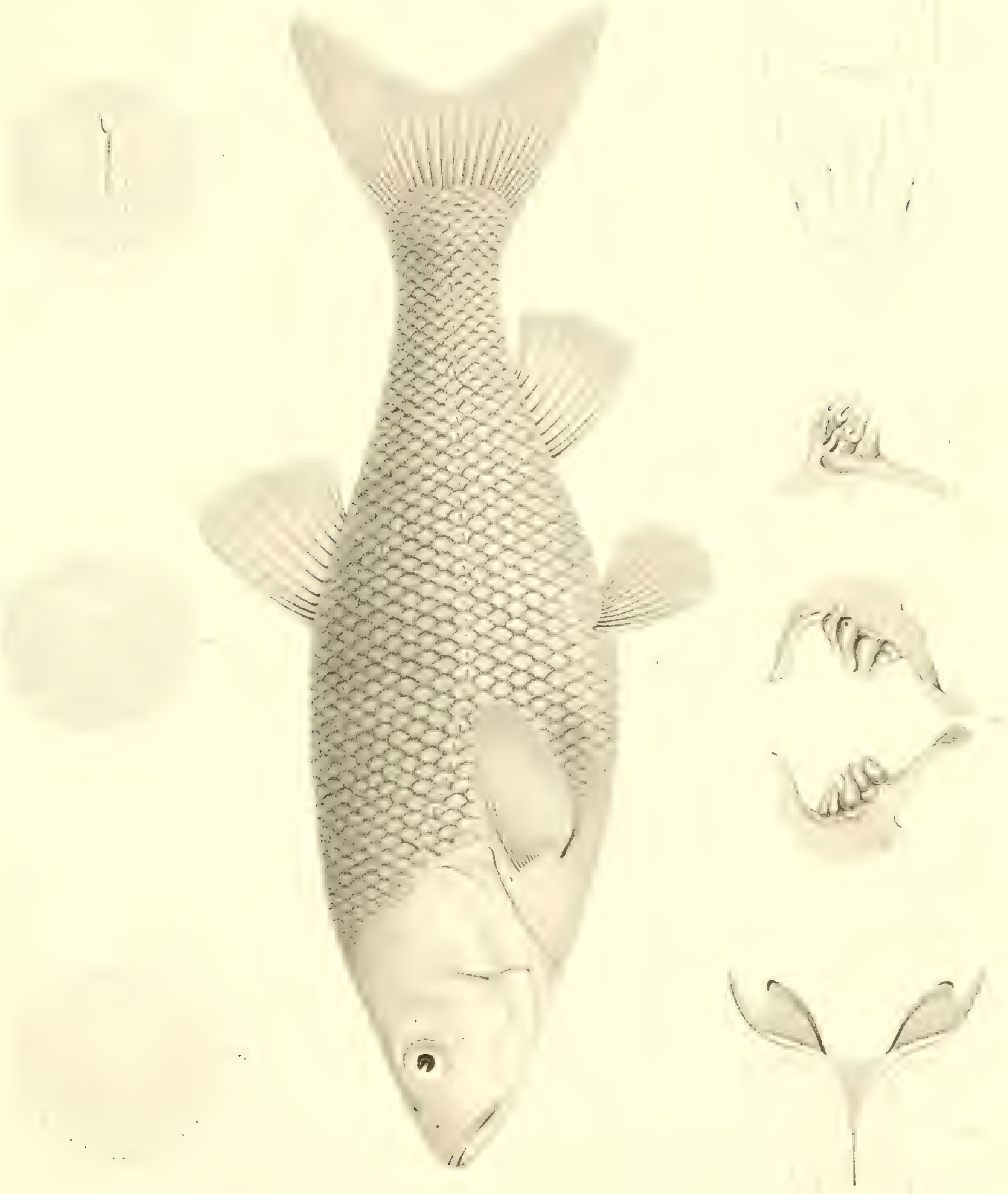
FIG. 4. A scale from the side below the lateral line.

FIG. 5. A scale from the side above the lateral line.

FIG. 6. The pharyngeal bones.

FIG. 7. The right pharyngeal bone, representing the surfaces of the teeth.

The grinding-surface of the teeth is not a character of generic importance in the genus *Tigoma*.



TIGOMA SQUAMATA GILL.

J. H. Richard

PLATE V.

PLATYGOBIO COMMUNIS Gill.

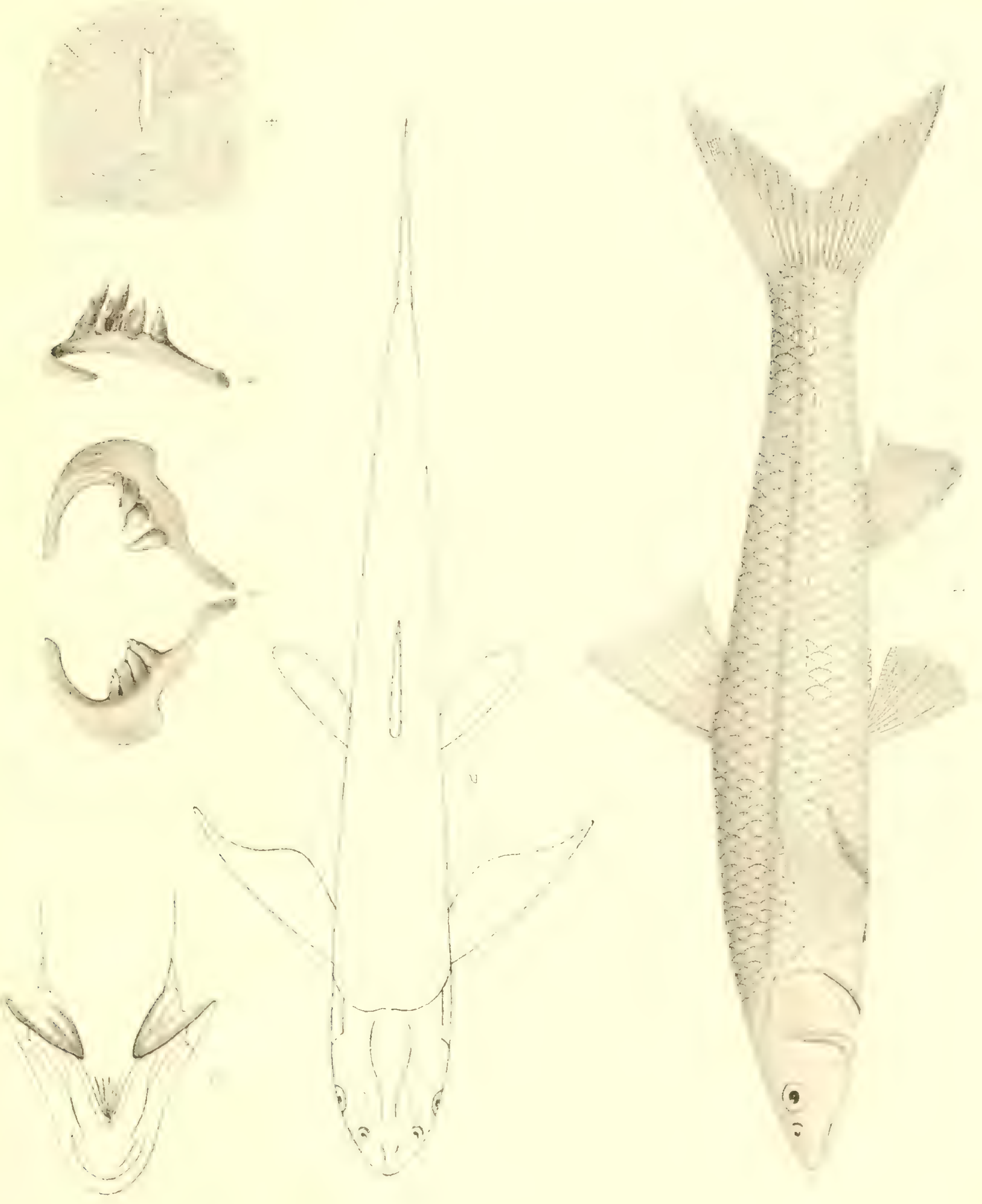
Fig. 1. Side view of fish, showing the small size of the head, the large scales, and the form and position of the fins especially the relative position of the dorsal and ventral fins. (The caudal peduncle is represented too slender.)

Fig. 2. The body as seen from above, showing the broad head. (The head does not diminish in breadth so rapidly before the eyes as represented in the figure.)

Fig. 3. The head as seen from beneath, to show the isthmus separating the lips and the width of the isthmus dividing the branchial apertures.

Fig. 4. The pharyngeal bones.

Fig. 5. The pharyngeal bone of the right side, to exhibit the grinding-surfaces of the teeth.



PLATYGOBIO COMMUNIS, GILL

J.H. Richard

T. Sinclair's lith. Phila.

PLATE VI.

ICTALURUS SIMPSONII GILL.

FIG. 1. Side view of fish, showing the slender body, the form and position of the fins, especially the furcate caudal and the large eyes.

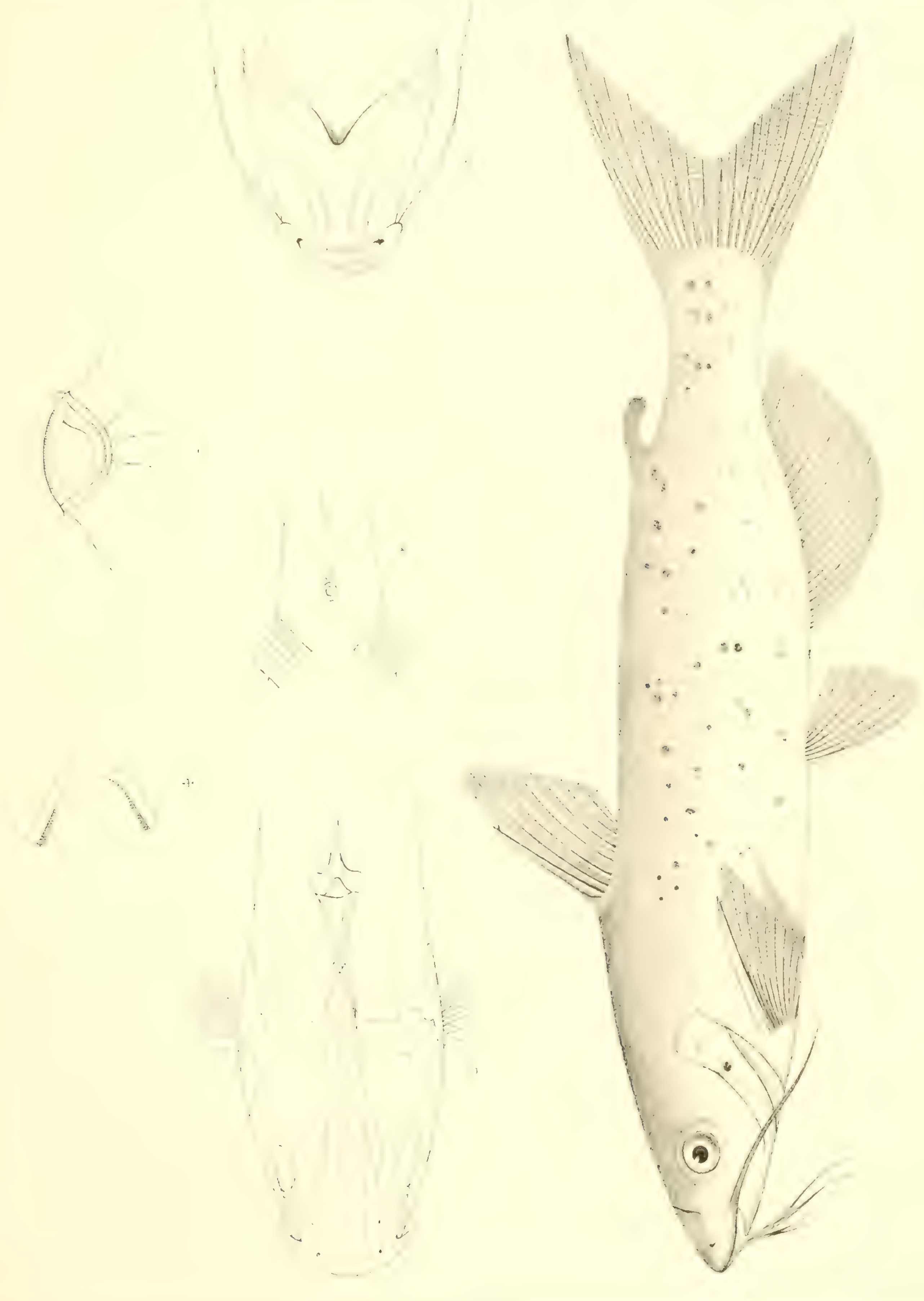
FIG. 2. The head from above, showing the connection of the supraoccipital with the head of the second interspinal.

FIG. 3. The head from beneath, exhibiting the emargination of the branchiostegal membrane.

FIG. 4. The open mouth from a lateral view.

FIG. 5. The open mouth from a front view, to exhibit the dentition.

FIG. 6. The inferior part of the body.



[illegible] SIMPSONII GILL.

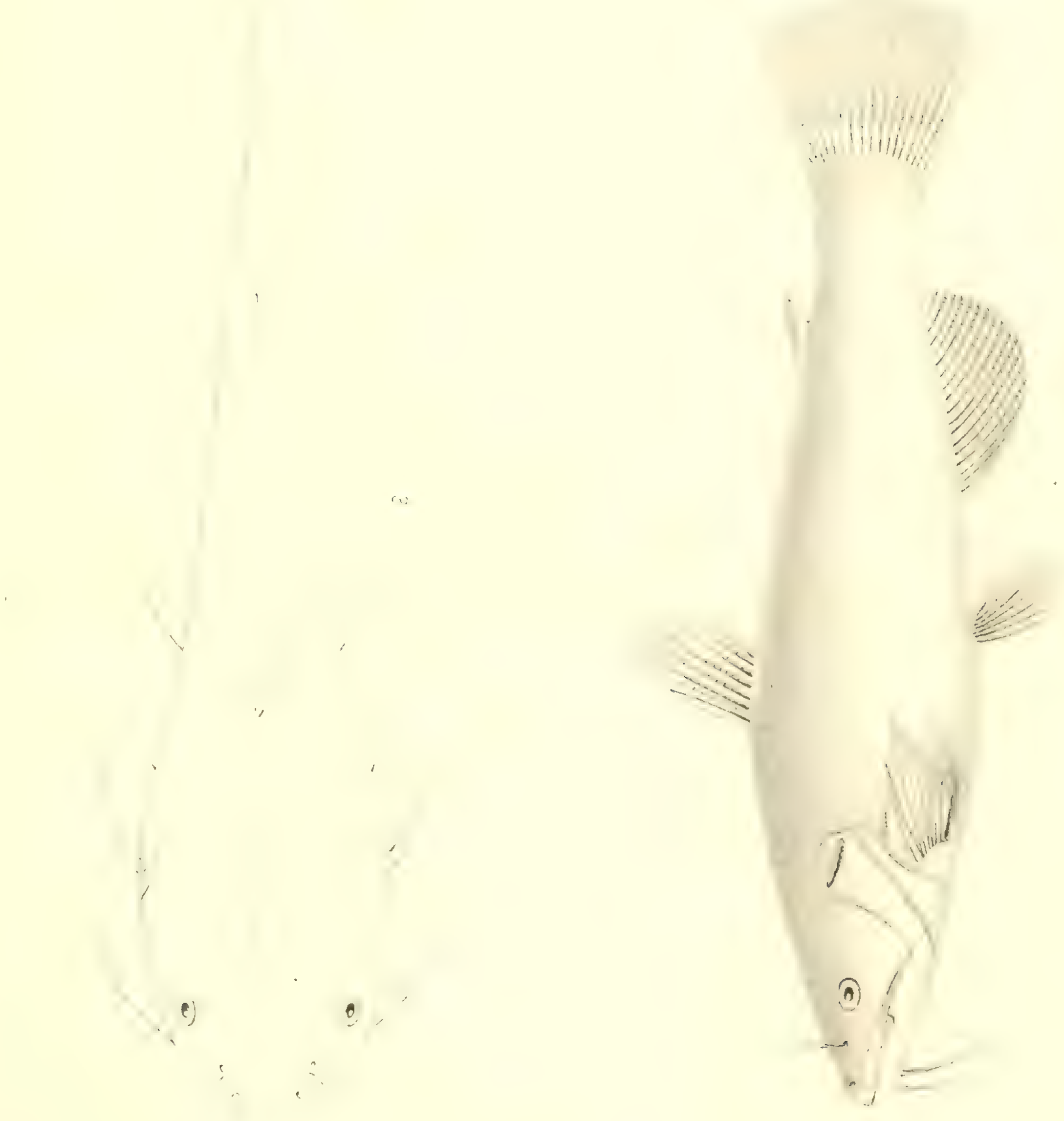
J. H. Richard del.

T. Sinclair & Son.

PLATE VII.

AMIURUS OBESUS Gill.

Fig. 1. Side view of fish, illustrating the form and position of the fins, especially the caudal.
Fig. 2. The upper surface of the body, showing the shape and breadth of the head.



AMIURUS OBESUS GILL.

[illegible]

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PLATE VIII.

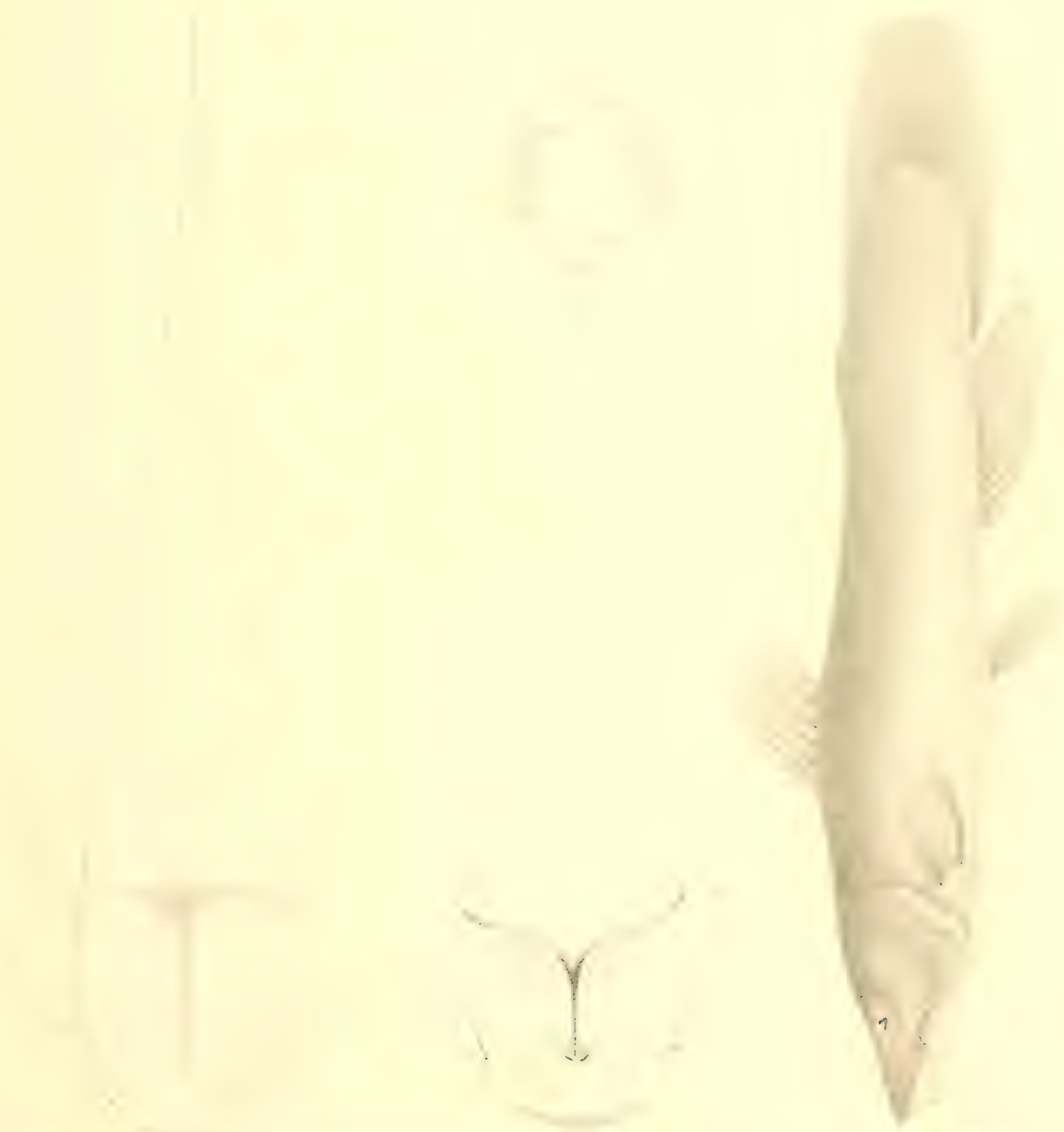
NOTURUS OCCIDENTALIS Gill.

Fig. 1. Side view of fish, showing the peculiar form of the adipose, dorsal, and caudal fins.

Fig. 2. View of the dorsal surface, showing the broad head with its ⊤-shaped depression.

Fig. 3. View of the inferior surface of the head.

Fig. 4. The open mouth; the teeth are robust. The lateral extension of the intermaxillary band of teeth is not a generic character.



NOTURUS OCCIDENTALIS, GIRARD.

PLATE IX.

HOPLADELUS OLIVARIS GILL.

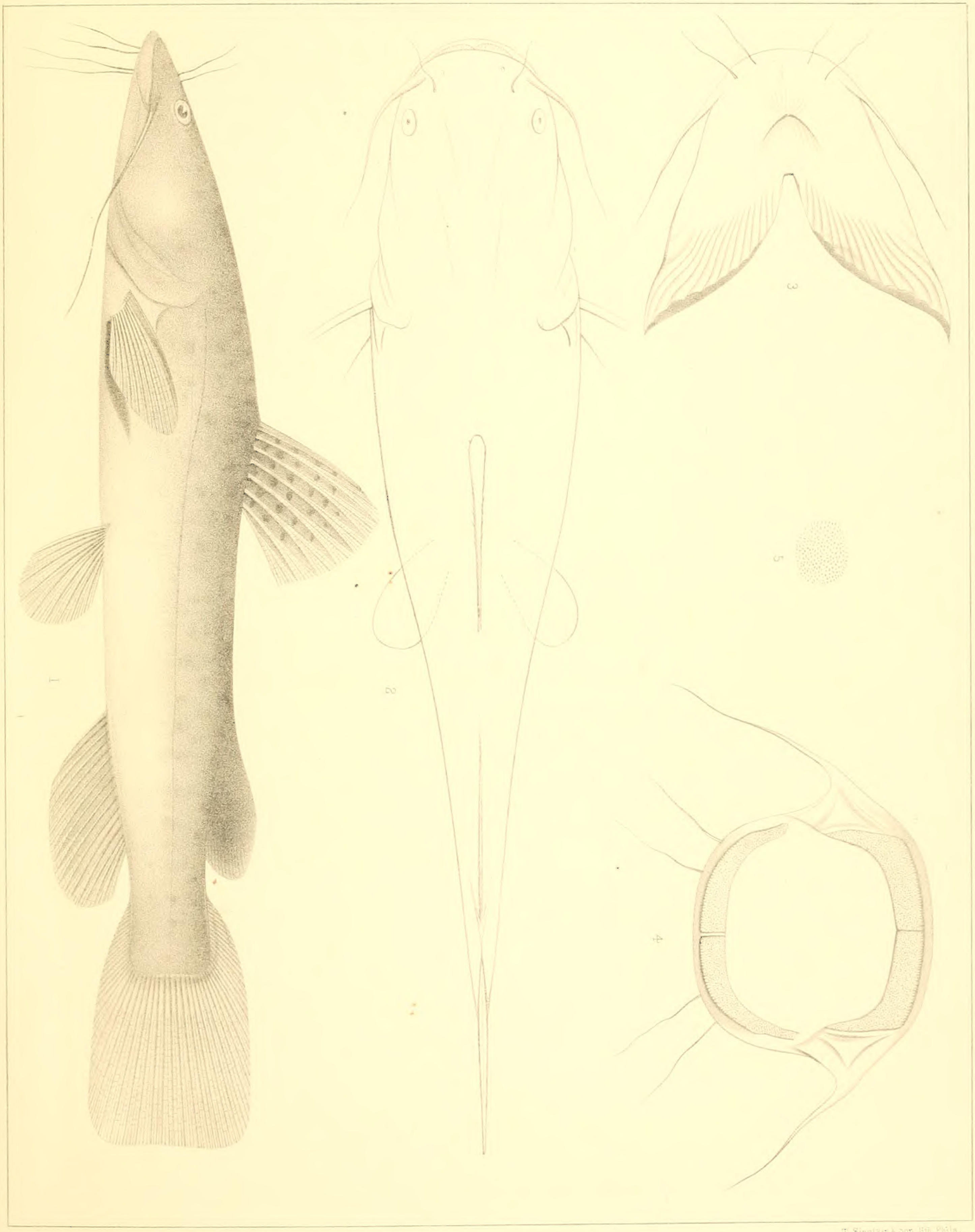
FIG. 1. Side view of fish, illustrating the peculiar form of the body and fins.

FIG. 2. Dorsal view of fish to show its width and the form of the head.

FIG. 3. The head from below, with its many (twelve) and broad branchiostegal rays. The lower jaw protrudes beyond the upper.

FIG. 4. The open mouth, with its broad bands of minute villiform teeth, and the posterior extension of the intermaxillary bands.

FIG. 5. Intended to illustrate the appearance of the skin.



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ILYICHTHYS LIMOSUS GILL.

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